

**BULLETIN
OF THE
UNIVERSITY
OF VERMONT
1974-75**

We, the faculty of the University of Vermont, in the spirit and tradition of free universities throughout the world, are agreed upon the following statement of principles on academic freedom and responsibility.

We believe that incorporation of these principles into the organization of the University of Vermont will re-emphasize the importance of academic freedom to the basic health of the University, and also serve as a statement of policy on the rights and responsibilities of faculty members at this institution. It has been our intent to state these principles in terms broad enough so that they may be valid not only in these critical times when academic freedom and personal liberty are in jeopardy both at home and abroad, but also in the future insofar as the future can be foreseen.

The Necessity of Academic Freedom in Higher Education. The main purpose of a university has always been, must always be, to stimulate the thinking and the creative powers of its students and its faculty. As an institution it deals in ideas, not only old and accepted ones but new ones that may be full of explosive power. If they are explosive they are bound to be disconcerting, even painful, to some on the campus and to many beyond its bor-

**SEPTEMBER
1974**

ders. Inevitably they will be called dangerous by the timid and short-sighted, but to those who really believe in the fruitfulness of human thought, the real danger would appear only if the flow of such ideas should cease. For then indeed sterility would have taken over our campus. Our faculty would no longer deserve the name of intellectuals and our students, regardless of degrees attained, could no longer claim to be educated. They would leave our campus accustomed only to the commonplace, satisfied with the mediocre, ignorant or afraid of ideas which catch fire.

Academic freedom is therefore not solely a right or privilege of the faculty but is the fulfillment of the obligation on the part of the University to provide an atmosphere in which intellectual growth may take place.

Academic Freedom and Special Responsibilities of Faculty Members. We subscribe to the following statement on academic freedom and the responsibilities of faculty members adopted by the American Association of University Professors: "The teacher is entitled to full freedom in research and in the publication of the results, subject to the adequate performance of his other academic duties, but research for pecuniary return should be based upon an understanding with the administration of the institution.

"The teacher is entitled to freedom in the classroom in discussing his subject, but he should be careful not to introduce into his teaching contro-

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The University of Vermont fully supports and complies with Title VI of the Civil Rights Act of 1964 or other appropriate Federal Legislation and does not discriminate in any way in any of its policies on the basis of race, color, national origin, or sex.

THE CATALOGUE

1974 - 1975

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The University of Vermont reserves the right to make changes in the course offerings, degree requirements, charges and regulations and procedures contained herein as educational and financial considerations require, subject to and consistent with established procedures and authorizations for making such changes.

Although its legal title is The University of Vermont and State Agricultural College, the University is known to its students and alumni as UVM. This popular abbreviation is derived from the Latin Universitas Viridis Montis.

Bulletin of the University of Vermont

VOLUME 72

SEPTEMBER 1, 1974

NUMBER 4

Published by The University of Vermont, 85 South Prospect Street, Burlington, Vermont, 05401, 16 times a year: once in October, November, January, February, April, May and June; twice in September, December, and March; three times in August. Second Class postage paid at Burlington, Vermont 05401.

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The Engineers Council for Professional Development

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 ROBERT CESARE GUIDULI, M.D. (1966) *Clinical Assistant Professor of Ophthalmology*
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 WALTER D. GUNDEL, M.D. (1971) *Assistant Professor of Medicine*
 ROBERT ERWIN GUSSNER, S.T.B. (1969) *Assistant Professor of Religion*
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- *WILLIAM LAROS MEYER, Ph.D. (1962) *Associate Professor of Biochemistry*
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- WILLARD MARSHALL MILLER, Ph.D. (1969) *Assistant Professor of Philosophy*
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 PHILIP M. RHINELANDER, B.A. (1972) Instructor in Music
 DALLAS D. RHODES, M.A. (1973) Assistant Professor of Geology
 GEORGE RICHARDSON, D.D.S. (1973) Clinical Instructor in Oral Surgery
 *VERONICA CHRISTINE RICHEL, Ph.D. (1969) Associate Professor of German
 DONALD L. RIFE, M.D. (1970) Clinical Assistant Professor of Psychiatry
 HEATH KENYON RIGGS, Ph.D. (1940-42; 1953) Professor of Mathematics
 B. ALBERT RING, M.D. (1959) Professor of Radiology
 *S. ALEXANDER RIPPA, Ed.D. (1960) Professor of Education
 ANTHONY W. ROBBINS, M.D. (1972) Clinical Associate Professor of Medicine
 *DONALD STETSON ROBINSON, M.D. (1968) Associate Professor of Medicine
 LINDA J. RODD, M.A. (1971) Instructor in Psychology
 B. SUSAN ROGERS, B.S. (1973) Instructor in Medical Technology
 MARGARET DAMM ROLAND, Ph.D. (1966) Assistant Professor of Art
 *JON ERIK ROLF, Ph.D. (1970) Assistant Professor of Psychology
 *ALFRED BROOKS ROLLINS, JR., Ph.D. (1967) Professor of History
 FRANCIS E. ROMER, Ph.D. (1974) Visiting Assistant Professor of Classics
 DIRK ROMEYN, M.D. (1967) Clinical Assistant Professor in Obstetrics
 and Gynecology
 ANDRES ROOMET, M.D. (1974) Assistant Professor of Neurology
 *ALFRED FELIX ROSA, Ph.D. (1969) Assistant Professor of English

- LAURENCE M. ROSE, J.D. (1974) *Instructor in Business Administration*
 JEAN G. ROSENBERG, M.A. (1973) *Instructor in Economics*
 DAVID ROSENBLUM, Ph.D. (1973) *Assistant Professor of Political Science*
 WILLIAM C. ROSKAM, M.A. (1973) *Clinical Instructor in Neurology*
 *WILFRED ROTH, Ph.D. (1964) *Professor of Electrical Engineering*
 *HOWARD ROTHSTEIN, Ph.D. (1962) *Professor of Zoology*
 *KENNETH S. ROTHWELL, Ph.D. (1970) *Professor of English*
 MARILYN M. ROTHWELL, B.S. (1973) *Clinical Instructor in Medicine*
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 JOHANNA M. RUESS, M.D. (1973) *Assistant Professor of Rehabilitation Medicine*
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 ELEANOR MARY RUSSELL, B.S. (1967) *Instructor in Medical Technology*
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 CHARLES BRUSH RUST, M.D. (1948) *Clinical Professor of Orthopedic Surgery*
 JACK RUTLEDGE, Ph.D. (1974) *Assistant Professor of Animal Sciences*
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 WILLIAM JOHN RYAN, M.D. (1970) *Clinical Assistant Professor in Medicine*
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 LOIS A. SABIN, B.S. (1972) *Clinical Instructor in Nursing*
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 PETER SALZBERG, M.A. (1972) *Instructor in Physical Education*
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 SAMUEL SAMPSON, Ph.D. (1972) *Professor of Sociology*
 PHILIP G. SANFACON, M.D. (1972) *Assistant Professor of Medicine*
 *FREDERIC OBERLIN SARGENT, Ph.D. (1962) *Professor of Resource Economics*
 *KENNETH P. SAURMAN, D.Ed. (1970) *Associate Professor of Education*
 JANET RUTH SAWYER, Ph.D. (1968) *Associate Professor of Nursing*
 ROBERT NEWTON SAXBY, M.D. (1954) *Assistant Professor of Radiology*
 JANE M. SAYER, Ph.D. (1974) *Visiting Assistant Professor of Chemistry*
 *LEONARD MICHAEL SCARFONE, Ph.D. (1963) *Professor of Physics*
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 ALVIN L. SCHEIN, D.D.S. (1973) *Clinical Instructor in Surgery*
 WILLIAM MURRELL SCHENK, M.A. (1965) *Associate Professor of Communication and Theatre*
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 *WOLFE WILHELM SCHMOKEL, Ph.D. (1962-64; 1965) *Professor of History*
 KAY F. SCHMUCKER, Ed.D. (1968) *Assistant Professor of Education*
 EDWIN CALVIN SCHNEIDER, M.S. (1946) *Professor of Agricultural Engineering*
 *PETER SCHOFIELD, D.Ph. (1970) *Assistant Professor of Biochemistry*
 N. JAMES SCHOONMAKER, Ph.D. (1956) *Professor of Mathematics*
 *HAROLD SEESSEL SCHULTZ, Ph.D. (1946) *Professor of History*
 *HERBERT LOUIS SCHULTZ, Ed.D. (1957) *Associate Professor of Music*
 J. DONALD SCHULTZ, M.D. (1970) *Assistant Professor of Epidemiology and Environmental Health*
 GEORGE ADAM SCHUMACHER, M.D. (1950) *Professor of Neurology*
 ROBERTA B. SCHWALB, M.A. (1958) *Associate Professor of Nursing and Clinical Assistant Professor of Obstetrics and Gynecology*
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 DAVID A. SCRASE, Ph.D. (1971-73) (1974) *Assistant Professor of German*
 RICHARD SEGURA, B.A. (1971) *Assistant Professor of Military Studies*
 KENNETH A. SEID, Ph.D. (1970) *Assistant Professor of English*
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 WILLIAM W. STONE, M.A. (1946) Adjunct Professor, Extension
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 DAVID LATHAM TABER, M.D. (1953) Clinical Assistant Professor of Obstetrics and Gynecology
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 HOWARD CANNING TAYLOR, III, M.D. (1962) Associate Professor of Pathology
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 RUTH THOMSON, M.S. (1969) Clinical Assistant Professor of Psychiatry
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 WILLIAM ALLAN TISDALE, M.D. (1965) Professor of Medicine
 JAMES MARTIN TODD, Ph.D. (1969) Clinical Assistant Professor of Psychiatry
 HELENE WALLACE TOOLAN, (Mrs. J.M.) Ph.D. (1964) Clinical Associate Professor of Pathology
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- THOMAS DERMOTT TRAINER, M.D. (1960) Professor of Pathology
 *RAYMOND HERMAN TREMBLAY, Ph.D. (1953) Professor of Resource Economics
 *JACK TREVITHICK, Ph.D. (1946) Professor of English
 *MARSHALL MACDONALD TRUE, Ph.D. (1966) Assistant Professor of History
 JOHN Y. TRUMPER, M.D. (1970) Clinical Instructor in Pediatrics
 HENRY M. TUFO, M.D. (1970) Associate Professor of Medicine

- ARTHUR FREDERICK TUTHILL, M.S. (1943) *Professor of Mechanical Engineering*
- JOHN CUSHMAN TWITCHELL, M.D. (1961) *Associate Professor of Medicine and Instructor in Epidemiology and Environmental Health*
- ROBERT S. TYZBIR, Ph.D. (1973) *Assistant Professor of Human Nutrition*
- *LOUIS MALDONADO UGALDE, Ph.D. (1962) *Associate Professor of Romance Languages*
- RALPH UNDERHILL, Ph.D. (1974) *Associate Professor of Sociology*
- HELENA A. URE, M.S. (1968) *Assistant Professor of Nursing*
- H. CARMER VAN BUREN, M.D. (1962) *Associate Professor of Medicine*
- FREDERICK WILLIAM VAN BUSKIRK, M.D. (1946) *Professor of Radiology*
- CANUTE VANDERMEER, Ph.D. (1973) *Professor of Geography*
- PAUL VELTMAN, M.S.W. (1972) *Assistant Professor of Home Economics*
- JENNIE G. VERSTEEG, B.A. (1974) *Assistant Professor of Home Economics*
- DENIS VERSWEYVELD, M.F.A. (1972) *Instructor in Art*
- *HUBERT WALTER VOGELMANN, Ph.D. (1955) *Professor of Botany*
- MARIE VOGELMANN, B.S. (1972) *Instructor in Music*
- *BRANIMIR F. von TURKOVICH, Ph.D. (1971) *Professor of Mechanical Engineering*
- JAMES R. WADSWORTH, V.M.D. (1951) *Adjunct Associate Professor of Animal Pathology*
- *WILLIAM PHILIP WAGNER, Ph.D. (1966) *Associate Professor of Geology*
- LOUIS J. WAINER, M.D. (1969) *Clinical Instructor in Medicine*
- DAVID HAWKES WAITE, Ph.D. (1969) *Assistant Professor in Communication and Theatre*
- H. ALAN WALKER, M.D. (1969) *Clinical Instructor in Medicine*
- JULIAN ARNOLD WALLER, M.D. (1968) *Professor of Epidemiology and Environmental Health*
- LESTER JULIAN WALLMAN, M.D. (1948) *Professor of Neurosurgery*
- MAURICE JAMES WALSH, M.D. (1968) *Clinical Instructor in Medicine*
- ROBERT D. WALZ, M.A. (1972) *Assistant Professor of Military Studies*
- RICHARD RALPH WARNER, Ph.D. (1967) *Associate Professor of Political Science*
- FRANK J. WATSON, M.A. (1971) *Instructor in Education*
- ROBERT JAMES WATSON, D.M.D. (1968) *Clinical Instructor in Oral Surgery*
- LELON ASHLEY WEAVER, JR., Ph.D. (1962) *Assistant Professor of Psychiatry*
- *GEORGE DAYTON WEBB, Ph.D. (1966) *Associate Professor of Physiology and Biophysics*
- *FRED CLARENCE WEBSTER, Ph.D. (1951-53; 1956) *Professor of Resource Economics*
- SELINA WILLIAMS WEBSTER, (Mrs. T.M.) M.S. (1948-51; 1960) *Associate Professor, Clothing and Textiles*
- TRUMAN MARION WEBSTER, Ph.D. (1945) *Professor of German*
- LAURA WEED, M.D. (1969) *Clinical Associate Professor of Medicine*
- LAWRENCE L. WEED, M.D. (1969) *Professor of Medicine*
- *JOHN GEORGE WEIGER, Ph.D. (1958-62; 1964) *Professor of Romance Languages*
- SHELDON WEINER, M.D. (1970) *Associate Professor of Psychiatry*
- FRANCIS ALEXANDER WEINRICH, M.A. (1950) *Assistant Professor of Music*
- *JAMES GRAHAM WELCH, Ph.D. (1968) *Professor of Animal Sciences*
- *DAVID LLOYD WELLER, Ph.D. (1967) *Associate Professor of Agricultural Biochemistry*
- *JOSEPH WELLS, Ph.D. (1968) *Associate Professor of Anatomy*
- GEORGE WILLIAM WELSH, M.D. (1956) *Associate Professor of Medicine*
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- ALAN PHILIP WERTHEIMER, Ph.D. (1968) *Associate Professor of Political Science*
- PIETER WESSELING, Ph.D. (1967) *Assistant Professor of Romance Languages*
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- JANET E. WHATLEY, Ph.D. (1973) *Assistant Professor of Romance Languages*
- CLARENCE C. WHITCOMB, M.D. (1973) *Assistant Professor of Pathology*
- *WILLIAM NORTH WHITE, Ph.D. (1963) *Professor of Chemistry*
- SUSAN MARION WHITEBOOK, Ph.D. (1969) *Assistant Professor of Romance Languages*
- *DAVID WHITEHORN, Ph.D. (1970) *Associate Professor of Physiology and Biophysics*
- *ROY ALVIN WHITMORE, JR., M.F. (1958) *Professor of Forestry*
- MARGARET BEACH WHITTLESEY, M.S.W. (1964) *Associate Professor of Social Welfare*
- *SAMUEL CLAUDE WIGGANS, Ph.D. (1963) *Professor of Plant and Soil Science*

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 NANCY M. WILBUR, B.A. (1969) *Clinical Instructor in Medical Technology*
 KAREN FERN WILEY, M.A. (1969) *Instructor in Romance Languages*
 *JAMES MATTHEW WILLARD, Ph.D. (1969) *Assistant Professor of Biochemistry*
 NEDRA WILLARD, M.S. (1972) *Assistant Professor of Nursing*
 BARBARA A. WILLIAMS, M.A. (1971) *Instructor in Mathematics*
 BLAIR WILLIAMS, M.S. (1946-48; 1949) *Professor of Human Nutrition and Foods*
 JOHN L. WILLIAMS, M.A. (1974) *Instructor in Communication and Theatre*
 PATRICIA L. WILLIAMS, Ph.D. (1972) *Assistant Professor of Communication and Theatre*
 *RONALD W. WILLIAMS, Ph.D. (1970) *Associate Professor of Electrical Engineering*
 LEWIS R. WILLMUTCH, M.D. (1970) *Assistant Professor of Psychiatry*
 *MARY SWEIG WILSON, Ph.D. (1969) *Associate Professor of Communication and Theatre*
 MAXINE D. WILSON, A.S. (1973) *Clinical Instructor in Neurology*
 CHRIS G. WOELFEL, Ph.D. (1968) *Adjunct Associate Professor of Animal Sciences*
 GEORGE A. WOLF, JR., M.D. (1970) *Professor in Medicine*
 ARTHUR D. WOLK, M.D. (1970) *Clinical Instructor in Pediatrics*
 GLEN MEREDITH WOOD, Ph.D. (1950) *Associate Professor of Plant and Soil Science*
 WILLIAM ALOYSIUS WOODRUFF, M.B. (1962) *Associate Professor of Psychiatry*
 *CHARLES A. WOODS, Ph.D. (1971) *Assistant Professor of Zoology*
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 DAVID A. MILLER, M.S. (1969) *Administrative Associate, Medicine*
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- Coordinator, Education

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	<i>Director of Volunteer Programs</i>
	<i>Catalogue Librarian, Dana Medical Library</i>

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MARY OLIVE BOYNTON	<i>Librarian, Medical Library</i>
HAZEL C. BROWN	<i>County Extension Agent</i>
HAROLD C. COLLINS, B.S.	<i>Director of Admissions</i>
DAVID D. DEMSKY	<i>Superintendent of Grounds and Custodians</i>
J. EDWARD DONNELLY, M.A.	<i>Director of Athletics</i>
HORACE BYRON ELDRED	<i>Director of Audio-Visual Services</i>
RUDOLPH J. FISCHER	<i>Superintendent, Project Construction</i>
FORREST WILKINS KEHOE	<i>Superintendent of Buildings and Grounds, and Associate Registrar</i>
LAURA LOUDON	<i>Assistant in Public Relations</i>
MARJORIE ELLINDWOOD LUCE	<i>State Home Demonstration Leader</i>
MARGARET MacDONOUGH	<i>County Extension Agent</i>
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M. PAULINE ROWE	<i>Supervisor and Program Leader, Extension</i>
MARY JEAN SIMPSON, Ph.B.	<i>Dean of Women</i>
ROGER WHITCOMB	<i>County Extension Agent</i>

Experiment Station Staff

AGRICULTURAL

The Agricultural Experiment Station has as its essential functions to conduct research in agriculture and home economics, to administer certain regulatory statutes, and to publish the results of such work.

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KENNETH ROGERS SIMMONS, Ph.D.	Animal Scientist
ROBERT ORVILLE SINCLAIR, Ph.D.	Agricultural Economist, Farm Management
ROBERT ERIK SJOGREN, Ph.D.	Associate Microbiologist
ALBERT MATTHEWS SMITH, Ph.D.	Dairy Scientist
ARTHUR H. SMITH, Ph.D.	Assistant Agricultural Economist
JOHN WALLACE SPAVEN, B.S.	Editor
RAYMOND HERMAN TREMBLAY, Ph.D.	Agricultural Economist, Farm Management
VERNON B. TUXBURY, M.E.E.	Administrative Associate
KATHLEEN BEAVINGTON WEBB, B.S.	Associate Editor

FRED CLARENCE WEBSTER, Ph.D.
 JAMES GRAHAM WELCH, Ph.D.
 DAVID LLOYD WELLER, Ph.D.
 SAMUEL CLAUDE WIGGANS, Ph.D.
 GLEN MEREDITH WOOD, Ph.D.
 IAN A. WORLEY, Ph.D.

*Agricultural Economist, Marketing
 Animal Scientist
 Associate Biochemist
 Horticulturist
 Associate Agronomist
 Assistant Ecologist*

ENGINEERING

JOHN OGDEN OUTWATER, Sc.D.

Mechanical Engineer

RELATED SERVICES STAFF

The Related Services Division renders various services in the fields of agriculture and home economics, such as inspection of feed, seeds, and fertilizer; analysis of soils, milk, and other agricultural products on request; diagnosis of diseases of plants, poultry and other livestock, and analyses for the Vermont Parimutual Racing Commission.

THOMAS WHITFIELD DOWE, Ph.D.
 WESSON DUDLEY BOLTON, D.V.M.
 HOLLIS EARL BUCKLAND, B.S.
 KENNETH STEWART GIBSON, M.S.
 ROGER WALTER MURRAY, D.V.M.
 KAY MILLIGAN NILSON, Ph.D.
 HARRY LEONARD SAWYER, JR., B.S.
 JAMES ROGER WADSWORTH, V.M.D.
 ROBERT THOMAS WETHERBEE, M.S.

*Dean and Director
 Animal Pathologist
 Seed Analyst
 Dairyman
 Associate Animal Pathologist
 Associate in Dairy Manufacturing
 Associate Chemist
 Animal Pathologist
 Chemist*

V Extension Service Staff

The Cooperative Extension Service is a cooperative undertaking of the State of Vermont, the University of Vermont and State Agricultural College, the United States Department of Agriculture, and the several counties of the State. It has a State staff, with headquarters at the University, and a staff of county extension agents in the University Extension Service Centers in each county. Its purpose is "to aid in diffusing among the people . . . useful and practical information on subjects relating to agriculture, home economics, resource development, community development and related subjects, and to encourage the application of the same." It also brings general University educational information to the people of the State. Its programs are available to all the people of the State, including both adults and youth.

THOMAS WHITFIELD DOWE, Ph.D.
 ROBERT POWERS DAVISON, M.Ed.
 HENRY VERNON ATHERTON, Ph.D.
 MARK S. BATTLES, B.S.

*Dean
 Director
 Dairy Bacteriologist
 Urban Youth Specialist*

MALCOLM IRVING BEVINS, M.S.
 CHARLES WHITNEY BIGALOW, M.S.
 WILLIAM H. BINGHAM, M.S.
 WESSON DUDLEY BOLTON, D.V.M.
 RONALD F. BOUFFARD, B.S.
 MARTHA A. BURT, B.S.
 CHARLES LYMAN CALAHAN, M.S.
 MARY C. CARLSON, B.A.
 F. ALINE COFFEY, B.S.
 WAYNE R. CROSIER, B.A.
 ROBERT W. DUMVILLE, B.A.
 DWIGHT KIMBALL EDDY, M.E.Ed.
 JAMES ALBERT EDGERTON, M.Ext.Ed.
 NORRIS ARTHUR ELLIOTT, B.S.
 THEODORE ROSS FLANAGAN, Ph.D.
 RAYMOND THOMAS FOULDS, JR., M.F.
 KENNETH STEWART GIBSON, M.S.
 ALAN GOTTLIEB, Ph.D.
 VERLE RANDALL HOUGHABOOM, Ph.D.

ESTHER L. KNOWLES, M.S.
 KARIN KRISTIANSSON, M.A.
 WILLIAM PATRICK LEAMY, M.S.
 GEORGE BUTTERICK MACCOLLOM, Ph.D.
 SUSAN MATHESON, M.A.
 THOMAS JAMES McCORMICK, M.E.Ed.
 LEONARD SMITH MERCIA, M.S.
 MILO J. MOORE, M.S.
 GORDON ROY NIELSEN, Ph.D.
 NORMAN EUGENE PELLETT, Ph.D.
 MONICA B. PORTER, B.A.
 FAITH KENYON PRIOR, M.S.
 JOHN WALLACE SPAVEN, B.S.
 DORIS HOSMER STEELE, Ph.D.
 WILLIAM WILLARD STONE, M.A.

BARENT W. STRYKER, III, M.S.
 KATHLEEN LEBARON STRASSBURG, M.A.T.
 NOAH THOMPSON, M.E.Ed.
 ENOCH HAROLD TOMPKINS, M.S.
 ROBERT L. TOWNSEND, M.S.
 WILLIAM VERNON TUXBURY, M.Ed.
 TINA M. VALENTINETTI, B.S.
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 WINSTON ARTHUR WAY, M.S.
 ANNE B. WEAVER, B.A.
 KATHLEEN BEAVINGTON WEBB, B.S.
 FRED CLARENCE WEBSTER, Ph.D.
 CHRIS G. WOELFEL, Ph.D.
 ALICE M. WRIGHT, B.S.

Agricultural Economist
Extension Economist
Area Resource Development Specialist
Animal Pathologist
Government Liaison Specialist
Nutrition Assistant
Horticulturist
Special Programs Assistant
Nutritionist
4-H Community Development Assistant
R.C.D.A. Resource Specialist
Agricultural Economist
Area Program Coordinator
Area Community Affairs Specialist
Associate Agronomist
Forester
Dairyman
Ext. Res. Plant Pathologist
Agricultural Economist, and
Environmental Programs Coordinator
Housing Specialist
Associate Editor
Dairyman, DHIA
Entomologist
Urban Youth Specialist
Associate Editor
Poultryman
Housing and Utilities Engineer Specialist
Entomologist
Ornamental Horticulturist
Director, Windsor Family Center
Home Management Specialist
Editor
Area Program Coordinator
Area Program Coordinator and
Rural Development Specialist
Area Resource Development Specialist
Clothing Specialist
Area Resource Development Specialist
Trainer, Evaluator and Statistician
Area Resource Development Specialist
Assistant Operations Director
Health Education Specialist
Animal Pathologist
Agronomist
4-H Community Development Assistant
Associate Editor
Agricultural Economist, Marketing
Dairyman
Assistant Nutritionist

County Extension Agents

Addison County

LUCIEN DEMERS PAQUETTE, M.E.Ed. (Agriculture)	Middlebury
JOHN FRANKLIN STEPHENSON, M.E.Ed. (Agriculture)	Middlebury
MRS. LEONA WARREN THOMPSON, B.S. (Home Economics)	Middlebury
BERNARD MAURICE NADEAU, B.S. (Youth)	Middlebury

Bennington County

JOHN CALVIN PAGE, M.S. (Agriculture)	Bennington
DIANNE E. HALL, B.S. (Home Economics)	Bennington
WILLIAM SNOW, B.S. (Youth)	Bennington

Caledonia County

PHILIP KAIR GRIME, M.E.Ed. (Agriculture)
 MRS. ALICE JOHNSON BLAIR, B.S. (Home Economics)
 PAMELA J. SMITH, B.A. (Youth)

St. Johnsbury
 St. Johnsbury
 St. Johnsbury

Chittenden County

ROBERT LACKIE CARLSON, B.S. (Agriculture)
 LOUELLEN WASSON, B.S. (Home Economics)
 ERIC C. NICHOLS, B.A. (Youth)

Essex Junction
 Essex Junction
 Essex Junction

Essex County

TIMOTHY M. WHITE, B.S. (Agriculture)
 S. ELLEN ROWE, B.S. (Home Economics)

Guildhall
 Guildhall

Franklin County

ERDEN WELLS BAILEY, B.S. (Agriculture)
 DONALD JAMES McFEETERS, M.S. (Agriculture)
 MARILYN S. WADE, B.S. (Home Economics)
 KATHERINE A. STAHL, B.A. (Youth)

St. Albans
 St. Albans
 St. Albans
 St. Albans

Grand Isle County

ROBERT ELLIS WHITE, B.S. (Agriculture)

North Hero

Lamoille County

SILAS HAMILTON JEWETT, B.S. (Agriculture)
 BEATRICE F. BUXTON, M.S. (Home Economics)
 NANCY J. LONG, B.S. (Youth)

Morrisville
 Morrisville
 Morrisville

Orange County

GORDON VOLNEY FARR, B.S. (Agriculture)
 MRS. SHIRLEY HALL CUSHING, B.S. (Home Economics)
 MRS. JUDITH CLARK, B.A. (Youth)

Chelsea
 Chelsea
 Chelsea

Orleans County

JOHN ROBERT PRICE, B.S. (Agriculture)
 RICHARD W. PRATT, B.S. (Agriculture)
 ROXANN CHAMBERLIN, B.S. (Youth)

Newport
 Newport
 Newport

Rutland County

WILLIAM MICHAEL COREY, M.S. (Agriculture)
 DAVID PAUL NEWTON, M.S. (Agriculture)
 MRS. BETHIA NOBLE MUNGER, B.S. (Home Economics)
 CHESLEY PECK HORTON, M.Ed. (Youth)

Rutland
 Rutland
 Rutland
 Rutland

Washington County

EDWARD L. BOUTON, B.S. (Agriculture)
 LYNN A. DICKEY, B.S. (Home Economics)
 DONALD ROBERT WHAPLES, M.S. (Youth)

Montpelier
 Montpelier
 Montpelier

Windham County

RAYMOND IRVING PESTLE, JR., M.S. (Agriculture)
 NANCY T. LENT, B.S. (Home Economics)
 HOWARD HARRY SMITH, B.S. (Youth)

Brattleboro
 Brattleboro
 Brattleboro

Windsor County

JOYCE WILLIAM SUMNER, B.S. (Agriculture)
 NANCY E. PARR, B.A. (Home Economics)
 EDWARD WALTER GOODHOUSE, B.S. (Youth)

Woodstock
 Woodstock
 Woodstock

Introduction

Webster defines a university as an educational institution of the highest level, typically with one or more undergraduate schools or colleges, together with a program of graduate studies and a number of professional schools, and authorized to confer various degrees, as the bachelor's, master's, and doctor's. A university is that and more—it is a community of scholars, skilled and seeking knowledge and understanding in a wide range of specialized fields, holding and seeking degrees in those fields; sharing a common campus and classrooms, laboratories, library, and other resources which support and make it possible for students and teachers to work together in pursuit of mutual and individual interests.

Today, more than ever, a university offers for the prospective student an opportunity to live and work in a community where he or she may find or make a place to suit his or her needs, and to achieve satisfaction and success commensurate with individual application.

It is still possible today, as probably it has always been, to achieve a degree without truly achieving an education and, regrettably, it is still true today that colleges and universities cannot always motivate each student to achieve his full potential or to find in formal education answers to the problems of his or her life.

But a university offers the student perhaps the broadest opportunity available in our free society to explore and advance his or her understanding of our heritage and the means which knowledge and understanding afford us of preserving and advancing what is best of our society.

The University of Vermont is the state and land-grant university of Vermont, one of a handful of U.S. institutions of higher education founded in the eighteenth century, the 20th oldest U.S. institution of higher learning authorized to grant degrees and the second founded by state legislative action to offer instruction at the university level.

It is a relatively small university—with approximately 9,000 students in its undergraduate, graduate and medical programs. It offers a wide range of opportunities (over 150 programs leading to 31 degrees) for students to elect to specialize through the College of Arts and Sciences; the College of Agriculture; the College of Education and Social Services; the College of Engineering, Mathematics and Business Administration; the

School of Home Economics, the School of Natural Resources, Environmental Program, and the Division of Health Sciences with its College of Medicine, School of Allied Health Sciences, and the School of Nursing. Advanced degree programs are offered through the University's Graduate College. Summer and evening programs provide additional study opportunities through the Division of Continuing Education.

The University is located at Burlington, Vermont, with the Green Mountains on the east and Lake Champlain and the Adirondacks to the west.

Burlington, the largest city in the State, with a population of 40,000, is 95 miles from Montreal, 230 miles from Boston, and 300 miles from New York City. The city has daily plane and bus service to these points. Amtrak rail service is also available.

The University of Vermont is a research, as well as a teaching center. Undergraduate as well as graduate and medical students have opportunities to participate in a varied program of research activity. Currently about 500 research projects supported by more than \$10,000,000 in grants from interested federal, state and private agencies are being carried out in such fields as cancer and heart research, muscular dystrophy, pollution, drug use, highway safety, color X-rays, ultrasound, thermal stress, origins of the cold war, ancient ethics and economic theory, leaf growth, microbial ecology of Lake Champlain and—perhaps a good place to stop—brain currents.

As the modern university emerges as an institution whose full resources serve a widening constituency, so are the education, research and service resources of the University of Vermont increasingly focused toward involvement with current and major problems and needs of our society. As a state and land-grant institution, the University of Vermont enjoys this role as a matter of tradition, and its faculty, staff and students are engaged in a wide range of programs which touch or affect the lives of citizens within the state and beyond its borders. Students and faculty have shown a growing interest in the need to foster and encourage a more meaningful dialogue both on and beyond the campus boundaries.

Regional Cooperation

The University of Vermont is an active participant with the Universities of Connecticut, Maine, Massachusetts, New Hampshire, and Rhode Island; and with Lowell Technological Institute, and the public two-year colleges and technical institutes in a program of regional cooperation aimed at increasing educational opportunities for qualified young men and women of the New England states. Under the program New England residents are given resident tuition privileges in certain specialized curric-

ula. A special brochure detailing these specialized curricula, has been prepared by the New England Board of Higher Education and is available through the Board, 20 Walnut Street, Wellesley, Mass. 02181.

The University of Vermont offers the following programs in which the Vermont in-state tuition rate is available for students from the states named.

REGIONAL PROGRAMS

OFFERED BY VERMONT	TO STUDENTS FROM				
	Conn.	Me.	Mass.	N.H.	R.I.
Canadian Area Studies	x	x	x	x	x
Classics		x			x
Dairy Technology		x		x	x
Radiologic Technology*	x	x	x	x	x
Latin					x

*Two-year program

The University Libraries

The main Library, dedicated in 1961, is named to honor the late Guy W. Bailey, thirteenth president of the University. It holds the largest book collection in Vermont, and acquires regularly the major periodicals, scholarly journals and indexing and abstracting services. The University collections also include books in medicine and health-related sciences, and a strong collection in medical periodical literature, maintained in the Dana Medical Library of the Division of Health Sciences.

The Bailey Library is a depository for United States and Canadian government publications, and acquires newspapers, pamphlets, maps, and materials in microfilm. The Special Collections Department includes books and manuscripts from the library of George P. Marsh, a significant Masefield poetry collection, and its Wilbur Collection is rich in books and manuscripts of those associated with the State, including Ira Allen, Henry Stevens and Dorothy Canfield.

The Physics and Chemistry Library is located in the Clinton D. Cook Physical Sciences building.

The University Archives in the Waterman Building contain the permanent official records of the University.

The Robert Hull Fleming Museum

The Museum houses the University collection of art and archaeology. Through its displays, special exhibits, lectures, films and other activities, it has served the cultural life and educational needs of the campus and the

people of Vermont since first established as the Park Gallery in 1873. Selections from a collection of some 6000 items covering the history of art are arranged to enrich teaching in various fields, particular galleries given to Ancient, Oriental, Tribal, American and European art. Two galleries are set aside for changing exhibitions that augment the collection, focusing on contemporary contributions to art, architecture and the crafts.

The Museum also offers a program of lectures, gallery talks and discussions, films, and guide services for schools and interested groups.

The Museum Association, open to the public, is composed of friends whose support makes possible the continued growth of collection and activities.

A study center for students and faculty, particularly those in art history and museology, the Museum basement houses the Art History Department collection of 35,000 slides and photographs. Museum staff serve as part-time faculty. Students work with the collection and with exhibitions and other Museum projects.

The George Bishop Lane Artists Series

The George Bishop Lane Artists Series is one of the major collegiate artists series in the country, inaugurated in 1955 by a gift from the late Mrs. Lane, in honor of her husband, George Bishop Lane of the Class of 1883.

The Lane Series brings to the campus and community a continuing program of musical, theatrical, dance and other artistic productions.

The Series is planned and produced by a student-faculty committee, with townspeople serving with student and faculty members on an advisory committee.

The Lane Series has presented many of the world's finest artists, including the London Philharmonia, the Vienna Philharmonic, the Philadelphia Orchestra, the Cleveland Orchestra, the Chicago Symphony Orchestra, the Moscow Philharmonic Orchestra with David Oistrakh, the Royal Ballet of London, the American Ballet Theatre, Rudolf Serkin, Artur Schnabel, Van Cliburn, Isaac Stern, Nathan Milstein, Andres Segovia, The Vienna Choir Boys, the Weavers, the Robert Shaw Chorale, the Budapest String Quartet, Dave Brubeck, Errol Garner, Benny Goodman, Victor Borge, Al Hirt, Mantovani, Harry Belafonte, Joan Baez, Maurice Chevalier, Bill Cosby, Ella Fitzgerald, Henry Mancini, Sir John Gielgud, Roberta Peters, the New York City Opera Company, the Metropolitan National Opera Company, the D'Oyly Carte Opera Company, and a number of plays including *Tea and Sympathy*, *Li'l Abner*, *Camelot*, *Man for All Seasons*, *Look Homeward, Angel*, *J. B.*, *Hello*,

Dolly!, *Hair*, *Jesus Christ Superstar*, Robert Merrill, Georg Solti (conducting the Chicago Symphony Orchestra), Lily Tomlin, Mary Travers, *Godspell*, and *Applause*.

In addition to three major series presented during each academic year, the Lane Series also sponsors a Chamber Arts Series in the spring semester, the Lane Summer Series, several youth concerts and special events, film series, and an extension series in Springfield.

Conferences and Institutes

An increasing number of groups hold educational conferences, institutes and seminars on the campus of the University, which is pleased to cooperate in making its facilities available for this purpose whenever it is possible to do so. Charges are made to cover costs to the University.

Further information may be obtained through the Office of Conferences and Institutes.

Educational Television

Vermont Educational Television is a state-wide network serving the schools and general public of the State of Vermont, and is owned and operated by the University of Vermont. The UHF television facility transmits in-school programming for grades 1 through 12 each week day. Evening programming includes network and locally-produced programs of both entertainment and instructional variety. In-service programs for specific vocational interests are aired, and courses are given for credit through the Evening Division of the University of Vermont.

Vermont Educational Television has received several national awards for locally produced programs.

Programs are broadcast over WETK-TV, Channel 33, Burlington; WVTB, channel 20, St. Johnsbury; WVER, channel 28, Rutland; and WVTM, channel 41, Windsor; and on channels 74, 76, 79 at Manchester, Wilmington, and Bennington.

Student Life

The general welfare of students is the responsibility of the Office of the Dean of Students.

Student Personnel Services

Student Personnel Services are available to assist students in the development of individual or group goals. These services include the offices of the Dean of Students, Director of Intercollegiate Activities, Director of Testing and Counseling, Director of Admissions, Director of Financial Aid, Director of Placement, Director of University Health Services, Advisor to Foreign Students and Scholars, Director of Housing, Director of Student Activities, and the Director of Office of Volunteer Programs.

Extensive resources applicable to group goals, purposes and organizational problems are offered through consultation with these offices. The student personnel staff is trained to work with individuals and groups in an effort to obtain optimum educational objectives and experiences.

COUNSELING AND TESTING CENTER The Counseling and Testing Center has been established to aid students toward becoming maximally effective as students and as persons. To help each student benefit from his university career and develop to the full limit of his potential, professional psychological services are provided for a wide range of concerns—educational, vocational, and personal. The Center offers confidential individual or group counseling and testing to all matriculating students, as well as to faculty and staff. Referral to other appropriate specialities such as Psychiatric Services, Reading Center, and Placement Office is also available.

CAREER PLANNING AND PLACEMENT SERVICE The Career Planning and Placement Service is organized to assist students and alumni in searching out and securing employment opportunities which will afford them the greatest satisfaction and utilization of their competencies. Many services are available through the office which will assist students and graduates in their occupational pur-

suits. An active on-campus career employment recruiting program is offered along with group and individual advisement. Assistance is offered in establishing Placement credential files, interviewing techniques, and resume writing in preparation for entry into the job market. Students also have access to an expanding career library which contains full-time positions, occupational briefs, the latest job market trends, salary surveys, and company literature which will help them in researching the various career fields and employers. The office also provides part-time and summer job opportunities.

FINANCIAL AID The University Financial Aid office counsels students on financial problems and administers the University's Scholarship and Loan Funds.

VETERANS ADMINISTRATION BENEFITS Students who are eligible to receive educational benefits from the Veterans Administration under the provisions of Public Laws 634 (veteran's child), 894 (disabled veteran), or 89-358 (veteran who served on active duty with the Armed Forces after January 31, 1955) should present a "Certificate for a Program of Education" or a "Certificate of Eligibility" to the Office of The Registrar at the time of registration. If the student is presently in training at another institution, he should complete a "Request for Change of School" form which may be obtained from his regional V.A. office. Questions regarding Veterans Administration benefits should be directed to the Office of The Registrar.

READING CENTER The University Reading Center, located in the Watterman Building, provides a free program for students who wish to improve their reading, vocabulary, and study techniques. Some tutorial services are also available. The first semester classes are open primarily to freshmen whose college entrance examinations indicate such a need. However, other students who are in need of improvement are urged to enroll in the reading program. Students who enroll are expected to attend regularly throughout the semester.

SPEECH AND HEARING CENTER Services of the Speech and Hearing Center, located in Pomeroy Hall are free to students in the University who have problems of speech, language, voice, and hearing; for example, problems of articulation, dialect, stuttering, inefficient voice production, hearing loss, and those problems associated with such conditions as cleft palate and cerebral palsy.

THE OFFICE OF VOLUNTEER PROGRAMS The Office of Volunteer Programs is a "partnership" between students and the University administration to make full use of facilities and human resources to meet the pressing human needs that exist in the communities surrounding the campus and elsewhere in Vermont. OVP's task is to assist students who want to be involved by providing information on where needs are, assistance in project planning, guidance in working out academic linkages and other support services such as transportation, recruitment, financing, training and publicity.

Volunteers work independently or in projects organized by several volunteers, which may include community and faculty as well as students, under advisement of community agency personnel and OVP. A student Project Coordinator may assume responsibility for coordinating the work of volunteers in his project. The Project Coordinator participates in a weekly Project Coordinators Council to assist in development of new projects and to administer Student Association appropriations in support of volunteer efforts.

The federally funded University Year for Action program is provided by OVP as a means for experienced student volunteers to spend a full year in a community project while linking learning and action. Approximately 50 students each year work in areas such as health, education, legal services and social services, in projects that assist in meeting the problems of poverty. UYA volunteers mobilize resources, do liaison and organizational work to achieve planned objectives in their projects. A learning program is tailored to meet the personal and educational objectives of each student within the context of his year long project. UYA students are expected to live in the communities where they serve, on a subsistence stipend, and to utilize university and faculty resources as needed to achieve project objects.

OVP Staff: Harold D. Woods, Director; John Engroff, Academic Coordinator; David Osgood, Field and Training Coordinator.

University Health Services

The University Health Service has resources for maintaining the well-being of the students. There are provisions for medical, minor surgical, orthopedic, gynecologic, and short-term psychiatric care as is necessary. Problems requiring sophisticated and prolonged care may be treated at the Medical Center Hospital of Vermont, or when feasible, at a hospital nearer the student's home. When long-term psychiatric therapy is necessary, it must be accomplished through a psychiatrist outside the Health Services at the student's expense. Pre-participation physical examinations and care of athletes is supervised by Health Services physicians.

The University Health Service is staffed by a Director, full-time staff physicians, and consultants in several specialty areas. The Nursing Staff consists of an Administrative Supervisor and nine registered Staff Nurses. The two Trainers are Registered Physical Therapists who administer their care at the Infirmary and Patrick Gymnasium Training Room. A part-time laboratory technician completes the professional staff.

The Infirmary is open all year; a nurse and members of the Rescue Squad are present at all times; physicians present during the week-days, and a physician on call nights and weekends for emergencies.

With the student's permission, parents will be notified of serious illness, injury, or admission to hospital.

Each student who has paid the Health Service fee is entitled to such routine medical care as is needed and as the Health Service can render during the academic year. Two days of no cost in-patient care at the Infirmary are granted. Beyond two days, the student will be charged \$20.00 per day for in-patient care.

Medical excuses from class activities due to illness or injury must be administered by the University Health Service.

Housing

Full time undergraduate students may live in University residence halls. Upper class students who are actives or pledges of a fraternity or a sorority may register for University residence hall housing or chapter housing. All freshman students except those living at home and commuting, or those living with their spouse, must live in University housing.

A. Residence Halls. Contracts for room and board are binding for the college year unless cancelled for due cause with the sanction of the Office of Residence Halls. In August each new student will receive notification of a housing assignment and the date and hour of the opening of his or her residence hall. Rooms may not be occupied until the date specified. Each student is expected to leave the residence hall not later than twenty-four hours after his or her last examination at the close of each semester.

Facilities for doing personal laundry are provided in residence areas as well as space for the storage of trunks, baggage, bicycles and skis. Bed linen and towels may be furnished by the student or rented from a commercial linen service which provides weekly delivery of two sheets, a pillow case, and three towels. Students provide their own window draperies, pillows, metal wastebaskets, bureau covers, desk and reading lamps. All students living in the residence halls must have board contracts.

In order to facilitate maximum educational growth from the residence hall experience, a diversity of residence halls and programs are offered. There are freshman halls, upperclass halls, an environmental hall, and a

French house. Each residence hall is under the guidance and direction of a Resident Adviser who is a member of the Student Personnel Staff. In addition, the Resident Adviser is assisted by specially selected undergraduate Resident Assistants. These staff members encourage the development of intellectual, social, and cultural programs and assist the residents in their growth toward maturity and responsible self direction. Each student in the residence halls is a member of his residence hall student government organization which represents student opinion and which provides educational and social programs for its constituents.

B. Fraternities and Sororities. Chapters of Greek letter fraternities and sororities have long been recognized as part of the intellectual, social, and extracurricular life on the campus. These groups provide valuable experience for their members in the form of interfraternity athletic competition, dances, service projects, house operations, meal service, and educational programs. Fraternities and sororities are under the jurisdiction of the Dean of Students office. Fraternity activities are coordinated by the Fraternity Forum and sorority activities are coordinated by a Panhellenic Council.

C. Married Student Apartments. Located just outside Winooski on Route 15, at historic Fort Ethan Allen, the University's Married Student Apartments are a four-mile drive from the main campus. Built in 1969, the development consists of 89 partially furnished apartments located in eleven two-story buildings. There are 56 garden apartments (42 two-bedroom and 14 one-bedroom) and 33 town house apartments (all two-bedroom). A centrally located service building contains laundry facilities and a multi-purpose community room. Within the complex are three ample parking areas.

Each apartment is furnished with an electric stove, refrigerator and water heater, kitchen cabinets and shelves, garbage disposal, and wall-to-wall carpeting. Every apartment has a private entrance and mailboxes are provided. The apartments are heated electrically and each room is individually controlled.

The apartments have achieved nationwide acclaim for their architectural design.

Detailed rental information may be obtained from the Director of Off-Campus Housing, 600 Dalton Drive, Winooski, Vermont, 05404.

D. Off-Campus Housing. University Students eligible to live off-campus may utilize the facilities of the Residence Halls Office in locating suitable housing in the greater Burlington area. This office provides a free listing service by which community landlords and rental agents are able to make known their housing availability to those persons associated with the University.

Students may examine up-to-date listings for available apartments, houses, and rooms for rent and information about houses for sale at the

Residence Halls Office or on a bulletin board just off the College Street entrance of Waterman Building on the main campus. The University is not responsible for the approval of off-campus housing facilities. It is impractical to send information concerning individual listings by mail. A catalog of available listings is issued each May, August, and December.

Additional information concerning housing off-campus may be obtained by contacting the Residence Halls Office, 25 Colchester Ave., Burlington, Vermont, 05401.

For information about the Living/Learning Center please see page 153.

Student Activities

The University officially recognizes the activities of a number of organizations supplementing the social, cultural, educational, and recreational needs of students. Because it is within this context that qualities of leadership may be developed, the University encourages participation consistent with its scholastic requirements. The students manage the affairs and finances of recognized organizations within the framework of the University's regulations.

RELIGIOUS LIFE Although the University cannot itself attempt to guide the religious life of its students, this work is carried out by several independent agencies: the B'nai B'rith Hillel Foundation; the Catholic Center; the Council for a Cooperative Ministry (sponsored by the American Baptist, Methodist, and Presbyterian churches, and the United Church of Christ); and the Episcopal Church at the University of Vermont. The Religious Counselors Association is a cooperative voluntary organization of the various religious leaders on campus. Though they have diverse religious traditions and ministries, they share common concerns in meeting the needs of the University community. In addition, the Inter-Varsity Christian Fellowship, the Christian Science College Organization, and the Church of Jesus Christ of Latter-Day Saints are represented on campus. Students desiring information on any of these groups are referred to the Office of Student Activities, Billings Center.

THE BILLINGS Center The major function of this multi-purpose building, located in the former Billings Library, is to provide the "where" for co-curricular activities in an atmosphere consistent with the goals of the University for individual development. Billings provides facilities for lectures and other programs sponsored by the various student organizations; small group conference rooms; study and recreational lounges; and snack bar facilities in the Catamount Den.

As the focal point of many student activities, most campus organization offices are located in Billings. Included are: Student Association; Panhellenic Council; Fraternity Forum; *Cynic*; *Ariel*; Billings Center Governing Board; Concert Bureau; and Speakers & Films.

In addition to these student organization offices, the Office of Student Activities in Billings Center provides many services to students. An all-campus information number, 656-2068, provides complete details on campus programs, rides wanted and offered, and general referral information. A staff of a director and a graduate assistant are available to any group for advice and information on program development and planning.

UVM STUDENT ASSOCIATION All students enrolled in the undergraduate colleges and schools are charged a student activities fee and thus become members of the UVM Student Association. A Senate, consisting of elected officers and representatives, holds weekly meetings during the year and conducts the regular business of the association. There are many opportunities for students to participate in the work of the standing or ad hoc committees.

INTER-RESIDENCE ASSOCIATION (IRA) The Inter-Residence Association is a government which represents the students living in University residence halls. The government, consisting of an executive board, legislative council and judicial board, provides leadership for residence hall students, representing their interests to other constituencies within the University community.

HONORARY SOCIETIES National Honorary Societies represented on the University of Vermont campus include:

The Phi Beta Kappa Society established the Vermont Alpha Center at the University in 1848, and initiates are chosen primarily on the basis of high scholastic standing, with emphasis on a broad distribution of liberal studies, including language and literature. The local chapter was the first in Phi Beta Kappa to initiate women into membership.

Mortar Board is a national honorary society for senior women. Although membership in Mortar Board comes as a high honor for a University of Vermont woman in recognition of outstanding service, scholarship, and leadership, it is also a challenge for continued sound and honest scholarship, and for unselfish service in the best interests of the college campus.

The Society of the Sigma Xi, established at the University in 1945, initiates those who have proved their ability to do research in one of the sciences including students who have a high scholastic standing.

Other national honorary societies include Alpha Omega Alpha, medicine; Alpha Zeta, agriculture; Kappa Delta Pi, education; Tau Beta Pi, engineering; Omicron Nu, home economics; Delta Sigma Rho-Tau Kappa Alpha, debating; Sigma Phi Alpha, dental hygiene; National Collegiate Players, dramatics; and Alpha Lambda Delta, freshman women's scholastic; Ethan Allen Rifles, outstanding students in the Reserve Officers Training Corps; Pershing Rifles, a military fraternity.

RECOGNITION SOCIETIES The several class societies recognize contributions to the University of Vermont and leadership in campus life. The Boulder Society, a local society for senior men, recognizes responsible student leadership, as does Mortar Board for senior women. Election to these societies is counted one of the highest honors that a University of Vermont man or woman can achieve. Other class recognition societies are Key & Serpent, a junior society, and Gold Key, a sophomore society.

The Staff & Sandal, recognition society for junior class women, and the Sophomore Aides, for women of the sophomore class, recognize leadership and scholastic achievement.

ATHLETICS, RECREATION AND INTRAMURAL PROGRAMS A program of intercollegiate competition for men is maintained in basketball, crosscountry, football, golf, hockey, indoor track, skiing, soccer, swimming, tennis, track. The athletic policies of the University are under the recommendation of the Athletic Council, composed of members of the faculty, the student body, and alumni. Athletic relations are maintained with colleges and universities in New England and the eastern seaboard. The University is a member of the "Yankee Conference," which is composed of the State Universities in New England, of the National Collegiate Athletic Association, the New England Intercollegiate Athletic Association, and the Eastern College Athletic Conference. The program of Physical Education offers an excellent program of intramural sports which provides for voluntary participation by students in all classes. Competition in nineteen different sports activities is arranged among fraternities, sororities, residence halls, independent groups, and individuals. In addition to regularly scheduled intramural contests, the facilities of Patrick Gymnasium are available at various times during the week for recreational free play in a wide variety of sports activities.

The Women's Intercollegiate program offers a variety of team and individual activities which are open to all full-time female students of the University. Intercollegiate competition is on the local and regional level under the auspices of the Eastern Association for Intercollegiate Athletics for Women, the Women's Eastern Intercollegiate Ski Association and the

United States Field Hockey Association. Varsity teams included in the program are as follows: Field Hockey, Soccer, Tennis, Volleyball, Basketball, Swimming, Synchronized Swimming, Gymnastics, Skiing, Lacrosse and Softball.

The Outing Club sponsors mountain climbing expeditions, ski trips, and other outdoor activities for both men and women students.

FRATERNITIES AND SORORITIES Chapters of Greek letter fraternities and sororities have long been recognized as part of the intellectual, social, and extracurricular life on the campus. These groups provide valuable experience for their members in the form of interfraternity athletic competition, dances, social work projects, house operation, and meal service. Fraternities and sororities are under the jurisdiction of the Dean of Students. Policies regarding the establishment of new chapters and the operation of present groups on the campus are subject to the authority of the University Council. Fraternity activities are coordinated by the Fraternity Forum and sorority activities are coordinated by a Panhellenic Council. The following are active chapters of national and local fraternities: Acacia, Alpha Gamma Rho, Alpha Tau Omega, Delta Psi, Kappa Sigma, Lambda Iota, Phi Gamma Delta, Phi Delta Theta, Phi Mu Delta, Sigma Alpha Epsilon, Sigma Nu, Sigma Phi, Sigma Phi Epsilon, Tau Epsilon Phi and Theta Chi. Chapters of the following national sororities are represented: Alpha Chi Omega, Alpha Delta Pi, Delta Delta Delta, Gamma Phi Beta, Kappa Alpha Theta, and Pi Beta Phi.

MUSICAL ACTIVITIES Opportunities for participation and appreciation are provided for students with strong musical interests. The University Band, the University Choir and the Choral Union, the University Madrigal Singers, and the University Orchestra appear in public presentations many times during the year. An opera or musical show is generally presented each year and faculty, senior, and monthly department recitals are scheduled throughout the year.

The University Band appears at football games, presents formal concerts, and makes a spring concert tour. The University Choir and the Choral Union give three annual concerts and the Madrigal Singers sing for various groups around the State. The University Orchestra presents two annual concerts, assists the Choir in a third, and plays for musical productions.

DRAMA, DEBATING, TELEVISION AND RADIO The Royal Tyler Theater is the home for the Season of Plays presented each year by the Department of Communication and

Theatre with the University Players, as well as the home for the annual Champlain Shakespeare Festival. The great periods of Theatre history are covered during the course of four years in the Major Play Series. Workshop productions of original and experimental theatre forms are also produced as part of the regular course work in Theatre as well as by students and faculty outside of the regularly scheduled course offerings. The Departments of Music, Communication and Theatre, and Women's Physical Education collaborate periodically to produce a musical comedy or opera. Participation in drama activities is open to all members of the University.

The Lawrence Debate and Discussion Club provides opportunities for participation in all types of forensic activities—debate, discussion, oratory, after-dinner, and extemporaneous speaking. Members of the club appear before service clubs, farm organizations, high schools, and other groups throughout the state. The members of the club participate in more than three hundred intercollegiate debates annually, with the beginners getting as extensive an experience as the veterans. The club travels to various discussion programs and to outstanding tournaments in the East. Outstanding performers receive recognition by election to Delta-Sigma-Rho-Tau Kappa Alpha, the national honorary forensic fraternity.

Two radio stations and one television station are located on campus. WRUV-AM is a wired-wireless station which has been broadcasting primarily to the campus since 1954. It is managed and staffed by undergraduate students. WRUV-FM is a 10-watt-educational station which began operation in 1965. Under faculty supervision, students operate this station as a integral part of the academic program in broadcasting offered by the Department of Communication and Theatre. The station serves the area within 10-15 miles of the University. Opportunity is provided for students to participate in the production of these programs.

STUDENT PUBLICATIONS The opportunity for journalistic, literary, and editorial expression is open to students interested in membership on one of the three major student publication staffs: the newspaper, *Cynic*, published weekly; the literary magazine, *The News and Weather*; and the yearbook, the *Ariel*.

CLASS ORGANIZATIONS The members of each freshman class form a class organization which retains its identity throughout the undergraduate years of its members and extends through subsequent years as long as there are living alumni of the class. Members of each undergraduate class elect officers each spring, except that officers elected at the end of the junior year serve through the senior year and to the end of the first reunion. Each senior class conducts the events of Senior Week.

V Admissions to the University

The University of Vermont welcomes applications from all interested students regardless of race, religion, nationality, or sex. Prospective freshmen and transfer students interested in applying for admission in either January or September can receive applications by writing to: Office of Admissions, Clement House, University of Vermont, Burlington, Vermont 05401. Applications for admission in January should be received in the Admissions Office by December 1, while applications for admission in September should be on file by February 1. An early notification program is available for prospective freshmen who are residents of Vermont. Vermonters applying under this program will be notified concerning admission by December 7 if the application, high school transcript, SAT scores and recommendations have been received by November 1. Upon filing an application, all candidates are required to pay a non-refundable \$15.00 application fee which is used to meet the cost of processing the application.

The University differs from a number of other colleges in not requiring a personal interview. We do hope students will find it possible to visit the campus to form their own first-hand impressions about the University. Prospective applicants may schedule appointments with current UVM students on most weekdays during the academic year. Such informal sessions give the applicant a chance to ask questions about the academic and nonacademic aspects of undergraduate life.

On most Saturday mornings while the University is in session, information group sessions will be held on campus for interested students and parents. Students should write or call the Admissions Office (802-656-3370) for additional information about the group meetings of individual appointments with student representatives.

Qualification for admission is determined on the basis of the secondary school record, rank in graduating class, recommendations, and College Entrance Examination Board Scholastic Aptitude Test results. Each application is carefully reviewed by the Admissions Office Staff and in many cases by the College or School to which the student is applying. The candidate's record is thoroughly examined in order to determine whether the student has adequately prepared for the academic program of his choice.

Sons and daughters of alumni of the University of Vermont are given

special consideration. Increasing competition means that the University must evaluate the application of each alumni son or daughter in terms of the total numbers of applications, their relative qualifications, and the limitation which must be placed on the number of applicants who may be offered admission in the various academic programs which are available.

Most prospective freshmen present at least 16 high school units, including a minimum of four years of English, two years of mathematics, two years of a foreign language, two years of science, and two years of social sciences.

The two years of mathematics should be one year of algebra and one year of geometry. Students who plan to specialize in engineering, forestry, mathematics or science should present both a second year of algebra and a course in trigonometry for a total of four years of mathematics. For students planning to major in nursing, high school courses in biology, chemistry, and physics are highly recommended.

Exceptionally qualified students may in some instances be admitted even though they do not meet the above requirements in full.

Additional courses in mathematics, history, science, the fine arts and music, and a third year in the foreign language are recommended as desirable preparation for college. In evaluating the secondary school record, careful attention is given to the course load a student has been carrying and any advanced work is given special consideration. A student planning to major in music must arrange for an audition and interview with the chairman of the department during the year preceding entrance.

Types of Enrollment

DEGREE STUDENTS Students who have presented appropriate credentials for admission and have been accepted as students in a degree program.

NON-DEGREE STUDENTS Students who have presented minimum credentials and are permitted to undertake *limited* course work (up to 6 credit hours per semester) for a purpose *other than* the earning of a degree.

Undergraduate Non-degree Students, those seeking *only* undergraduate credit for course work taken, enroll through the Division of Continuing Education.

Graduate Non-degree Students, those who have at least a bachelors degree at the time of enrollment, enroll through the Graduate College.

College Entrance Examinations

The College Entrance Examination Board will administer a series of scholastic aptitude tests during 1974 on November 2 and December 7, and

in 1975 on February 1, April 5, and June 28. Complete information may be obtained from the College Entrance Examination Board, P.O. Box 592, Princeton, New Jersey 08540.

Transferring to the University

Students interested in transferring to the University may apply for admission in either January or September. Applications for mid-year admission should be filed by December 1. Applications for fall admission should be filed by February 1. Transfer candidates should see that official transcripts of their high school and college records as well as a confidential report from the college previously attended are sent to the Office of Admissions in time for prompt consideration.

A student who transfers to the University from another accredited college or university may be given provisional credit for all courses satisfactorily completed, provided that similar courses are counted toward graduation at the University of Vermont. Transfer credit is not allowed for work completed with grade "D" or its equivalent, unless a more advanced course in the same subject has been passed with a higher grade in the institution from which the student transfers.

The credit is provisional, pending satisfactory completion of a semester's work at the University. The provisional transfer credits are fully granted if the student is in good standing at the end of the first semester.

Advanced Placement and Advanced Credit

The University of Vermont welcomes applications from high school students who have taken college level courses offered in their high schools under the Advanced Placement Program of the College Entrance Examination Board. Scores of three or higher on advanced placement examinations are awarded appropriate credit by the Registrar. Test scores of two will be evaluated by the department in order to determine whether credit should be granted.

A student who has been granted Advanced Placement may, upon the recommendation of the department and the student's academic dean, use his Advanced Placement to satisfy distribution requirements for his concentration.

Students who receive Advanced Placement may also receive course credit toward graduation requirements, upon approval of the department and the student's academic dean.

Credit by Examination

A degree student who wishes to do so may, under the following conditions, receive credit for a course by taking a special examination and paying the special examination fee charge of \$10 per credit hour.

A request for such an examination must be made in writing at least one month before the date of the examination, and it must be approved by the student's advisor, the chairman of the department in which the course is given, and the academic Dean, in that sequence. The student must neither have audited, previously received a grade, nor have attempted a prior special examination in this course at the University of Vermont or at any other institution of higher education. Upon passing the special examination, as determined by the examiner and the chairman of the department in which the course is given, the student receives credit, but not a grade, for the course. Credit by examination forms are available in the Office of the Registrar.

College Level Examination Program

The University of Vermont will grant credit on passing the College Level Examination Program (CLEP) General Examinations at the 50th percentile or better based on the sophomore norms (for those examinations which the relevant UVM departments have determined to be satisfactory. Departments may supplement CLEP results with their own examinations). The credit awarded will not exceed six (6) hours in each of five examinations for a total of thirty (30) hours. These credits may be applied toward distribution requirements and to the total hours specified for a particular degree program. No grade will be awarded and the number of credit hours will not be considered in determining cumulative average.

Pass-No Pass Option

Degree students, starting with the sophomore year, may elect to take certain of their courses on a pass-no pass option, with approval of their advisor. Please see page 71 for additional details.

Credit for Military Service

A veteran who has been accepted into a degree program may, upon presentation of DD Form 214, Report of Transfer or Discharge, receive certain credit for this experience. If the student has completed from six months to one year of military service, a total of up to six hours of credit

may be accepted as meeting the requirements of Military Science at the freshman and sophomore levels in those Colleges in which credit for military science is allowed. If the student has completed more than one year of military service, up to 12 hours of credit may likewise be accepted. In addition, the individual will be exempt from the physical education requirement.

The university accepts all college level credits earned through the United States Armed Forces Institute providing that credit is applicable to the degree program and, in addition, credit is granted for service schools completed, as recommended by the American Council on Education.

Orientation Program

Entering students are required to take the College Entrance Examination Board achievement tests in mathematics and modern foreign language in all cases where these subjects are to be continued in the student's curriculum. It is recommended that students who expect to continue with biology take the College Entrance Examination Board achievement test in biology. The scores on all tests are used in advising students regarding the course of study and the selection of courses. Following acceptance, students must submit a statement of medical history and a physical examination record to the University Health Service. New students are also required to come to the campus for a two-day orientation and enrollment. Schedules and dates of these meetings are mailed in late spring. The student will plan his course program with the advice of his advisor and academic dean and complete his registration for the September opening of college.

V Student Expenses

The student expenses outlined in the following paragraphs are only anticipated charges for the academic year 1974-1975. Changing costs may require an adjustment of these changes before the opening of the University.

APPLICATION FEE An application fee of \$15.00 is charged each applicant for admission to the University.

ORIENTATION FEE AND ADVANCED TUITION PAYMENT All undergraduate applicants who have been accepted by the University are required to pay \$175.00 in order to reserve a place in the next enrolling class. Twenty-five dollars of this payment is used to cover the costs of attending an orientation session. The remaining one hundred and fifty dollars is applied to the initial semester's tuition bill. The orientation fee is nonrefundable. Partial refunds of the advanced \$150.00 tuition payment will be granted under the following conditions:

1. Students accepted for the fall semester will receive a \$75.00 refund (half of the advanced tuition payment) if they notify the Admissions Office on or before June 1 that they do not plan to attend. Students who decide not to attend after this date will forfeit the entire payment.
2. Students accepted for the spring semester will receive a refund of \$75.00 (half of the advanced tuition payment) if they notify the Admissions Office on or before January 11 that they do not plan to attend. Students who decide not to attend after this date will forfeit the entire payment.

TUITION

UNDERGRADUATE STUDENTS

1. Vermont Residents: \$40.00 per credit hour through 11.5 hours. From 12-18 credit hours, \$475.00 per semester plus \$40.00 per credit hour for each hour in excess of 18.
2. Non-Resident: \$115.00 per credit hour through 11.5 hours. From 12-18 credit hours, \$1325.00 per semester plus \$115.00 per credit hour in excess of 18.

GRADUATE STUDENTS

1. Vermont Residents: \$40.00 per credit hour through 11.5 hours. 12 credit hours, \$475.00 per semester plus \$40.00 per credit hour for each hour in excess of 12.
2. Non-Resident: \$115.00 per credit hour through 11.5 hours. 12 credit hours, \$1325.00 per semester plus \$115.00 per credit hour in excess of 12.

NOTE: Courses taken for audit are always included in determining the number of credit hours for which a student is billed.

SENIOR CITIZENS Vermont residents who are over sixty-five years of age may enroll for courses for credit or non-credit, without tuition charges, on a space available basis.

ORDINARY FEES

LIBRARY BOND FEE A library bond fee of \$30.00 per year (\$15.00 per semester) is charged to all students enrolled for 12 hours or more except those registered in the College of Medicine. Students enrolled in less than twelve hours but more than three hours will be charged a fee of \$15.00 per year (\$7.50 per semester). Students enrolled in three hours or less per semester are not subject to the library fee. This fee is assessed by legislative act and turned over to the State of Vermont each year to the extent necessary to retire the bond issue that was used to fund the construction of Bailey Library.

GYM BOND FEE A gym bond fee of \$30.00 per year (\$15.00 per semester) is charged to all students enrolled for 12 hours or more. This fee is assessed by legislative act and turned over to the State of Vermont each year to the extent necessary to retire the bond issue that was used to fund the construction of Patrick Gymnasium, Forbush Pool, and Gutterson Field House.

STUDENT HEALTH SERVICE FEE A fee of \$48.00 per year (\$24.00 each semester)* is charged to all degree students enrolled for 12 or more hours. Non-degree and parttime degree students will be eligible for Health Services by paying this fee.

STUDENT ASSOCIATION FEE Undergraduate degree students enrolled for 12 or more hours are charged a fee of \$21.50 per year (\$10.75 per semester). This fee is allocated by the Student Association toward the support of student organizations and student activities. First-year medical students who enter the College of Medicine after three years in the College of Arts and Sciences are charged the same fee.

SPECIAL FEES

VERMONT PUBLIC INTEREST RESEARCH GROUP FEE In response to a student referendum, the University has agreed to bill each undergraduate degree student a special optional fee of \$6.00 per year (\$3.00 per semester). Funds collected help support the activities of the Vermont Public Interest Research Group.

LOCKER-TOWEL FEE All men enrolled in physical education activity courses and others who wish to have an assigned locker must pay a four dollar locker-towel fee each year or any portion thereof. This fee provides a lock and clean towel after each use of the gymnasium facility.

LATE REGISTRATION FEE Failure to complete financial arrangements and registration by the first day of classes will result in a late fee of \$10.00.

* A modest increase is anticipated effective January 1975.

STUDENT HEALTH INSURANCE Through an arrangement with a commercial insurance company, students are able to procure health insurance which is designed to provide coverage for services beyond those provided by the Student Health Service. The present cost for one year's coverage is \$26.00. Married students may procure coverage for their spouse and children. Further details may be obtained from the infirmary. In order to participate in this insurance, the Student Health Service Fee must be paid.

CREDIT BY EXAMINATION A fee of \$10.00 per credit hour will be charged for administration of special tests in areas for which academic credit may be received.

FEES FOR COURSES IN MUSIC PERFORMANCE STUDY Private lessons are approximately one-half hour in length, fifteen being given in each semester. \$60.00 per credit hour will be charged each student for such courses.

FORESTRY SUMMER PROGRAM The tuition for the Forestry Summer Program for Vermont residents is \$200.00; for non-residents \$288.00. In addition, there may be charges for transportation.

TECHNICAL NURSING SUMMER PROGRAM The tuition for the summer session will be at the summer session credit hour rate. University housing and food service are available for those who desire it.

ROOM CHARGES AND FEES

ROOM CHARGE Rooms in University residence halls are rented for the academic year and the prices are uniform in all residence halls. For each occupant of a room in a residence hall, \$292.50 per semester is charged. The charge for a single room, when available, is \$322.50. The charge for single occupancy of a double room, when available, is \$392.50 per semester. The residence halls are closed during the University recess periods and the University reserves the right to use student rooms to house University students in any of the residence halls during these recess periods. Normal charges for use of certain electrical appliances may be levied upon occupants of the residence halls.

Written notice is required of any student cancelling his room contract. Any student cancelling his contract after June 7 but before the beginning of the Fall semester, will be assessed a \$50.00 penalty. Unless specifically authorized by the Office of Residence Halls, no room cancellations will be honored after the opening of the Fall Semester.

KEY DEPOSIT A room key deposit of \$5.00 per year is also required and is returned upon the surrender of the key. Deposit will be added to room charges on the student bill.

INTER-RESIDENCE ASSOCIATION FEE A \$6.00 per year (\$3.00 per semester) fee is charged each dormitory resident to be used for the Inter-Residence Association.

BOARD All students living in a University residence hall are required to purchase a basic meal contract. This basic contract includes enough coupons to purchase roughly 10 meals per week which are 40 percent of the total board program offered. Additional coupons may be purchased in addition to the basic contract to meet individual needs. The charge for the basic meal contract is \$494 per year and additional coupons may be purchased for \$28 per booklet containing 140 coupons.

Any questions should be directed to the SAGA Food Service Office, Waterman Building, Attention: Food Service Director.

SPECIAL GRADUATE STUDENT FEES

THESIS COMPLETION FEE In the Graduate College a fee of \$25.00 per semester is charged each graduate student who has completed all course requirements but who enrolls for the purpose of completing his thesis.

ADVANCED DEGREE FEE A fee is charged to each recipient of an advanced degree according to the following schedule: PhD, \$25.00; Masters Degree (With Thesis), \$20.00; Masters Degree (No Thesis), \$10.00

SPECIAL MEDICAL STUDENT FEE

MEDICAL STUDENT ACTIVITY FEE All students in the College of Medicine are charged a fee of \$10.00 per year. This covers the cost of the medical yearbook and other student activities.

ESTIMATED YEARLY EXPENSES Estimated expenses (excluding transportation, laundry and spending money), based on the regular tuition for undergraduate students include the following:

Vermont Resident Tuition	\$ 950.00
Non-resident tuition	2,650.00
Meals (Base Plan)	494.00
Room	585.00
Library and Gym Bond Fees	60.00
Student Health Service Fee	48.00*
Student Association Fee	21.50
Residence Hall Activities Fee	6.00
Student Accident & Health Insurance (optional)	26.00
Books and supplies (estimated)	250.00
Vermont Resident Total	2,440.50
Excluding personal & miscellaneous costs	
Non-resident Total	4,140.50
Excluding personal & miscellaneous costs	

*A modest increase is anticipated effective January, 1975.

Engineering students add about \$50.00 for instruments. Dental Hygiene students add about \$465.00.

Students in the professional nursing program add about \$85.00 for uniforms and special equipment prior to the beginning of clinical nursing courses in the Junior year; students in the technical nursing program add about \$75.00 at the time of Freshman registration.

PAYMENT OF OBLIGATIONS All tuition, fees, room and board charges are payable in full upon notification and not later than the first day of classes. Advance payments are accepted; checks should be made payable to the University of Vermont.

Students who cannot meet their financial obligations because of unusual circumstances should contact the Accounting Office *prior* to registration.

Any student who has not satisfactorily completed financial arrangements by the first day of classes will be removed from the rolls of the university and enrollment will be terminated.

The University reserves the right to withhold the academic record of any student who is in arrears in the payment of outstanding charges.

BUDGETED PAYMENT The University has made arrangements with the Insured Tuition Plan of Boston for those who desire to budget annual costs in monthly installments. Information about the various payment programs is sent to each incoming student. For advance information, please write to:

Richard B. Knight Insurance Agency, Inc.

Insured Tuition Payment Plan

6 St. James Avenue

Boston, Massachusetts 02116

BILL ADJUSTMENT Bills will be adjusted as of the end of the three-week drop period and students will be held liable for the total credit hours in which enrolled at that time. If a course is dropped after that time, no adjustment or refund will be made.

At the end of the semester, an audit will be made of each student's record. If the audit reveals total hours are greater than at the end of the specified drop period, the student will be financially liable for the number of hours for which he was enrolled. Students will be charged for all hours as specified in policy statements regarding tuition.

TUITION REFUNDS

CANCELLATIONS Returning students who notify their academic dean and the registrar before the semester begins that they will not attend the university that semester, will receive a full refund of tuition and fees, room and meal contract. Refunds will be processed when notice is received by the Registrar.

WITHDRAWALS

1. A student may voluntarily withdraw from the university by notifying their academic dean and the Registrar. In the event of voluntary withdrawal a student will receive a refund of 50% of tuition up to the end of the fifteenth day of classes. No refund will be allowed after that day.

Note: Date and time of withdrawal normally will be the date the withdrawal notice is received by the Registrar.

2. Any student who withdraws for reason of health, as attested to by the university physician, before the end of the semester will receive a full refund.
3. *Suspension* If a student is suspended, no refund will be allowed.
4. *Dismissal* If a student is dismissed (permanently separated), no refund will be allowed for the semester in which the dismissal occurs.

5. *Death* In case of death of the student, tuition which has been paid for the semester during which the death occurs, will be fully refunded.
6. *Change of Status* A student who reduces his enrollment below twelve hours by an approved change of enrollment before the end of the drop period may be entitled to a partial refund of tuition and fees to reflect his new credit hour load.
7. *Refund of Fees and Other Charges*
 1. There is no refund of student fees.
 2. There is no refund of room charge.
 3. Board payments will be refunded on a pro-rata basis.

Financial Aid

Many worthy and deserving students are unable to meet college expenses and for them the University provides, so far as its resources permit, aid in the form of scholarships, loans, and employment. The extent of need and the type of financial assistance which can be awarded is determined by the Director of Financial Aid.

Entering students who want to apply for financial aid may do so by indicating their intention in the spaces provided on the Admissions Application Form and also submitting the Family Financial Statement directly to the American College Testing Program (preferably no later than April 1) with the notation that it be forwarded to the University of Vermont. The Family Financial Statement forms may be obtained from your high school or by requesting one from the Office of Financial Aid, 330 Waterman Building, University of Vermont, Burlington, Vermont 05401.

V General Information

The Vermont Legislature has established a lower rate of tuition for students who are Vermont residents. Such a policy appears to have as its objective the attempt to more evenly distribute the cost of operating and supporting the University of Vermont between Vermont residents whose taxes have previously supported the University and non-residents who have not done so.

The Legislature has stated that enrollment at an institution for higher learning or presence within the State for purposes of attending an institution of higher learning shall not constitute residence for tuition purposes.

IN-STATE STATUS REGULATIONS

Adopted by the Board of Trustees

October 6, 1973

The following requirements must be met by a student prior to being granted resident status for the purpose of admission, tuition and other University charges:

1. The applicant shall be domiciled in Vermont, said domicile having been continuous for one year prior to the date of application for a change in residency status. Changes in residency status shall become effective for the semester following the date of application.
2. Domicile shall mean a person's true, fixed and permanent home, to which he intends to return when absent. A residence established for the purpose of attending an educational institution or qualifying for resident status for tuition purposes shall not of itself constitute domicile. Domicile shall not be determined by the applicant's marital status.
3. The applicant must demonstrate such attachment to the community as would be typical of a permanent resident of his age and education.
4. An applicant receiving financial support from his family shall not be granted resident tuition status unless the supporting family member is domiciled in Vermont, or was so domiciled at the time of his death.
5. An applicant becoming a student at an institution of higher learning in Vermont within one year of first moving to the state shall have created a rebuttable presumption of residence in Vermont for the purpose of attending an educational institution.
6. A student who is eligible for tuition purposes to enroll as a resident student in another state shall not be enrolled as a "Vermont Resident."
7. A student enrolling at the University of Vermont shall be classified by the appropriate admissions officer (Director of Admissions, Dean of the Graduate College, Associate Dean of the College of Medicine) as a resident or non-resident for admission and tuition purposes. The decision by the officer shall be based upon information furnished by the student and other relevant information. The officer is authorized to require such written documents, affidavits, verifications or other evidence as he deems necessary.
8. The burden of proof shall in all cases rest upon the student claiming to be a Vermont resident.
9. The decision of the admissions officer on the classification of a student as a resident or non-resident may be appealed in writing to the Committee on Residence whose decision shall be final.

These regulations shall become effective October 6, 1973, for all applications thereafter filed. Except as to applications filed prior to October 6, 1973, all previous regulations or definitions concerning Vermont resident status are superceded and of no force and effect.

STUDENT LEAVE OF ABSENCE POLICY

A leave of absence means that a student who is eligible for continued enrollment ceases to be enrolled while in good standing and is guaranteed readmission. This policy benefits both the student and the University in that it enables a student to plan on readmission to the University and allows the University, by having records on the expected date of return of its students, to refine further the planning of the size of the student body. The following statements further define a leave of absence:

- a. Upon application to his or her academic dean a student may be granted a leave of absence by that dean when that application merits the commitment of the University to insure the student's readmission.
- b. A leave of absence must be granted for a finite period of time.
- c. A leave of absence normally may not exceed four semesters.
- d. A leave of absence normally may not be granted for the current semester after the last day on which courses can be dropped without penalty.
- e. A leave of absence may not be granted to students currently on academic trial or disciplinary probation.
- f. A leave of absence is distinct from withdrawing for medical reasons and is not granted for medical reasons.
- g. A leave of absence does not guarantee housing upon the student's return.
- h. A leave of absence guarantees readmission to the student's college in the University, if the student confirms his or her intent to return by the closing date for a normal readmission application (October 31 and March 31 preceding the appropriate semester).
- i. While on a leave of absence, an individual's student status is temporarily terminated. A leave of absence guarantees an individual's readmission only if he or she takes the appropriate action.
- j. A leave of absence should be confirmed by the appropriate form signed by both the student and the dean of the college involved.

Academic Discipline

CONDUCT The general principle governing the conduct of students is set forth in the following "ancient law" of the University:

The conduct of the students toward all men is to be regulated by those plain rules of politeness, honor, and religion which are binding on every free and virtuous community. They are to conform to every requirement of the faculty, which may arise from their relations as instructors, counselors and guardians, and as upright men and good citizens they shall use all lawful exertions to prevent and expose all violations of the laws of God and of the country, and whatever is at variance with the objects of the University.

Toward this end, the University expects each student to maintain high standards of personal conduct and social responsibility at all times both on and off campus. All students as responsible citizens, are required to observe and to share in the support of all local, State and Federal regulations. Any student who fails to uphold these standards is subject to disciplinary action by the University.

The disciplinary authority of the University is vested in the President. In such cases as he considers proper, this authority may be delegated to the several deans and to appropriate judicial bodies. **The continuance of each student at the Uni-**

versity, the receipt by him of academic credits, his graduation and the conferring of any degree or the granting of any certificate are strictly subject to the disciplinary powers of the University. The University is free to cancel his registration at any time on any grounds, if it considers such action to be for the welfare of the institution.

University policy on the above matters is explained in detail in "The Student Handbook." Each student is held responsible for knowledge and observance of these rules and regulations.

Policy Statement on Campus Dissent and Disruption Adopted by
the Trustees on December 5, 1970

The University of Vermont is a place to learn and to teach. It is not a cloister—it does not live in a vacuum. It is both in the world and of the world. Its mission is to educate people for leadership in society.

Board of Trustees, May 1969

As the above quotation suggests, the University functions within the rules governing a larger society. It was created by that society for a special purpose: the facilitation of learning and teaching.

It follows that the University's regulations must conform with the law as well as take account of the particular role of educational institutions.

Fundamental to our entire philosophy is our firm belief that rights guaranteed by the First and Fourteenth Amendments to the Constitution of the United States must be protected on the campus as elsewhere in our society and further, that civil laws must prevail on the campus.

Within the University setting as within society at large, the exercise of one's rights must be tempered by recognition of the rights of others. For example, the exercise of free speech may unreasonably infringe upon the right to learn. It should not be surprising that conflict may arise between parties engaged in activities which are individually lawful, for a fundamental function of social organization is the reconciliation of competing interests.

Within the University setting more than any other, the appropriate means for conflict resolution is rational discourse. The processes fundamental to the existence of the University cannot be abandoned under stress, especially since they represent the most effective means for progress. Further, the criteria employed to seek lawful accommodation of various interests must grant special attention to the central mission of the University; learning and teaching.

The laws of society and the mission of the University establish the framework within which disagreement, dissent, demonstration, and advocacy may, indeed must, occur. For mankind to progress, the educational process must be dynamic even if fraught with controversy, for change cannot take place until the first question is raised. The discovery of new propositions or new solutions also may be followed by passionate advocacy. Such advocacy must never replace the continued pursuit of the University's essential purpose of learning and teaching.

It is within this context that the University rejects the use or threat of force as a means of resolving differences. Violence is both unnecessary and inappropriate for those who have access to reasoned discourse and is unacceptable within an institution dedicated to reason. For those who will not or cannot contend within this arena, the University must, after efforts at persuasion have failed, resort to the use of any legal remedy necessary. Such persons, consequently, may expect appro-

priate responses from either the University or civil authorities or both. Normally, the University will respond first, when failure to do so would present a clear and imminent threat to proper functions of the University. Civil action will be invoked when non-students are involved or when the severity of disruption requires such a step.

GUIDELINES

Since a clear differentiation between legitimate dissent and coercive disruption is difficult, it is the purpose here to provide explanatory guidelines:

1) The Board of Trustees, Administration, Faculty, Staff, Alumni, and Students recognize the crucial importance of maintaining open communication and dialogue in the process of identifying and resolving problems which evolve from the dynamics of University life.

2) Coercive disruption initiated by any person or persons within the University community will be met by that action of the University which is necessary to restore order and the communication required for rational solution of problems. Such action may include suspension, expulsion and/or arrest. Coercive disruption is generally defined here as activity which imposes the will of other persons or groups within the University community, outside of established procedures for the expression of opinion and the resolution of differences.

Coercive disruption is construed to include activity which:

- a) Denies the rights of students, the faculty, the staff or guests of the University.
- b) Disrupts or obstructs educational and other activities of the University.
- c) Reacts to the expression of the peaceful discourse of dissent of others by attempting to deny their rights.
- d) Obstructs or restricts free movement of persons on any part of the University campus.
- e) Denies the proper use of offices or other facilities to the students, faculty, officers, staff, or guests of the University.
- f) Endangers the safety of any person on the University campus.
- g) Threatens, or results in, the destruction of property.

It is to be understood that the phrase "educational and other activities of the University," includes the duly registered and lawful activities of recognized student organizations as well as other agencies of the University.

3) Because of its purpose, nature and function, it would be self-defeating for a University to attempt to prohibit or to even discourage dissent. Lawful and peaceful demonstration as an expression of favor or dissent should be permitted and protected.

4) Members of the academic community must be free to organize, discuss, pass resolutions, distribute leaflets, circulate petitions, picket and take other action which is not only lawful, but consistent with University policies and procedures; but they have an obligation to preserve the University's free and unhampered search for truth.

5) The activities of an individual or group of individuals cannot be allowed, in the name of free speech, to disrupt or interfere with the educational program.

6) Trespassers may be arrested and removed from University premises. Failure of a person on University property to follow a reasonably founded request to

leave University facilities, expressed by one duly authorized to make such a request, makes him a trespasser.

7) The University may decide to exercise its authority as property owner to eject members of the public who seriously abuse their privilege of coming upon the campus.

8) When groups organize a demonstration on campus which becomes disruptive, action may be taken against the group as well as individuals involved.

9) Becoming a member of the University community in no way abrogates, or compromises the rights which the Constitution of the United States guarantees to all persons. This principle applies to the adjudication of violations of campus policies as well as all other areas.

Policy Statement on Discrimination Adopted by the University Senate September 13, 1968

As a public institution, the University of Vermont opens its doors and facilities to any student on the basis of his or her character and ability and irrespective of race, religion, color or nationality.

Use of English

Correct English usage is demanded by all departments in the University. Written work of any kind which is unsatisfactory in manuscript form, grammar, punctuation, spelling, or effectiveness of expression may be penalized, regardless of contents. Students whose written work falls below the standard of correct usage may be remanded to the English department for additional instruction, even though the freshman course in English has been passed.

Before they may be admitted to the University, foreign students must offer evidence that they are capable of reading and writing English on the college level.

Army Reserve Officers' Training Corps

GENERAL Through Army ROTC college graduates receive regular or reserve commissions as officers in the United States Army. The University's Department of Military Studies offers courses in world military affairs to all University students, whether or not they are members of ROTC. Additionally, special courses for ROTC cadets offer basic education and training in military subjects, with emphasis on leadership.

PROGRAMS Two programs are offered: (1) A four year program comprising one course per term and a summer camp for six weeks between junior and senior year. (2) A two year program comprising one course per term during the junior and senior years, and two summer camps for six weeks each. Students are given pay and travel allowance for summer camp(s).

SCHOLARSHIPS Scholarships, available for four, three, two years and one year, provide tuition, books, laboratory fees and similar educational expenses, plus \$100.00 a month for up to ten months a year. The commitment is four years on active duty.

Applications for the four-year scholarships are made during the senior year in high school. Normally the cut-off date for submission is in January. News media keep the public informed as to the exact date. Interested students should request application forms from the U.S. Army Headquarters nearest to their home. Stu-

dents living in the Eastern United States should write to: Army ROTC, P.O. Box 12703, Phil., Pa. 19134.

FLIGHT TRAINING The Army ROTC Flight Training Program is open to qualified seniors. It is designed to train a reserve pool of Army aviators and affords students the opportunity to qualify for a Federal Aviation Agency private pilot's license. On-campus ground and a flight instruction under FAA licensed instructors is provided without cost.

POSTGRADUATE DEFERMENT Upon graduation, ROTC students are normally commissioned as officers in the U.S. Army Reserve and agree to serve on active duty for two years, subject to call to such duty. However, active duty may be deferred for as many as four years for those who wish to pursue an advanced degree while studying as full-time graduate students.

Air Force
Reserve Officers' Training Corps

GENERAL UVM students are eligible to participate in the Air Force ROTC program at St. Michael's College in nearby Winooski, Vermont. The St. Michael's College Department of Aerospace Studies offers courses in Air Power, National Security Forces and in Leadership and Management. For further information, contact the Department of Aerospace Studies, St. Michael's College, Winooski, Vermont 05404. Their telephone number is (802) 655-2000, ext 281 or 282.

PROGRAMS Two programs are offered: (1) A four year program, comprising one course per term and a four week Field Training camp between the sophomore and junior years. (2) A two year program, comprising one course per term during the junior and senior years, and a six week Field Training camp the summer before the student's junior year begins. Students are given pay and travel allowance for field training.

SCHOLARSHIPS Scholarships, available for four, three and two years provide tuition, books, laboratory fees, plus \$100.00 a month.

FLIGHT TRAINING The Air Force Flight Instruction Program is open to qualified seniors. On-campus ground school and flight instruction under FAA licensed instructors is provided without cost to the student.

POSTGRADUATE DEFERMENT It is possible for qualified students upon graduation to receive an educational delay to pursue an advanced degree.

COURSES OFFERED INCLUDE:

AS 101-103 UNITED STATES MILITARY FORCES IN CONTEMPORARY WORLD (Freshman in Four-Year Program) A full study of the doctrine, mission, and organization of the United States Air Force; United States strategic offensive and defensive forces; their mission and functions; and review of Army, Navy and Marine general purpose forces. Two semesters. One class hour each week. One Corps Training hour each week.

AS 201-203 DEVELOPMENT OF AIR POWER (Sophomores in Four-Year Program) An introduction to the study of Air Power. The course is developed from a historical perspective, starting before the Wright Brothers and continuing through the 1970's. Two semesters. One class hour each week. One Corps Training hour each week.

AS 301-303 NATIONAL SECURITY FORCES, I AND II (THE PROFESSIONAL OFFICER COURSE) Contemporary study of the role of the military and American society. Looks at the role and function of the professional military officer in a democratic society and the complex relationships involved in civil-military interactions. Such issues as antimilitarism and public attitudes toward defense spending, as well as military social action programs, the question of the military-industrial complex, and the implications of an all-volunteer military structure. The course concludes with an extensive analysis of the various dynamics involved in defense policymaking. Two semesters. Three class hours each week. One Corps Training hour each week.

AS 401-403 THE PROFESSIONAL OFFICER, I AND II (THE PROFESSIONAL OFFICER COURSE) An integrated management course emphasizing the individual as a manager in an Air Force milieu. The individual motivational and behavioral processes, leadership, communication and group dynamics are covered to provide a foundation for the development of the junior officer's professional skills as an Air Force officer. Two semesters. Three class hours each week. One Corps Training hour each week.

Physical Education

One year of physical education, normally completed during the freshman or sophomore years, is required of all undergraduate students. The two credits earned in activities classes will be included in the total number of hours required for graduation. Students may opt to take activities classes on a pass-no pass basis. (For further details see the pass-no pass heading under General Information). Medical examinations are required of all new students. Those with serious defects may be given restricted work or may be excused by the Director of Student Health.

University Responsibility

Many courses involve instruction in and the use of various types of power equipment, laboratory apparatus, and specialized facilities. The University takes every precaution to provide competent instruction and supervision of such courses. It is expected that students will cooperate by following instructions and exercising precaution. In case an accident does occur resulting in personal injury, the University can assume no responsibility except for medical care that is provided by the Student Health Service.

Student Health Insurance

Through an arrangement with a commercial insurance company, students are able to procure a student health insurance policy. The present cost for one year's coverage is \$26.00. Married students may procure coverage for their spouse and children. Further details may be obtained from the Infirmary.

Enrollment and Registration

Every student is required to enroll and register for each semester on the designated days, unless excused in advance by the dean of the college concerned. Any student in attendance who does not pre-enroll and register for the next semester at the designated time will be considered as a dropped student and may apply for readmission after one semester. Specific directions are published for each semester.

Changes in Enrollment

Any changes in enrollment after registration must be authorized by the dean of the college in which the student is registered. A student may add a course only during the first week of classes, but may drop a course without academic penalty during the first three weeks of classes. Change of enrollment forms are obtained from the departmental offices or advisers.

Auditing Courses

With the approval of the Dean and the instructor concerned, a regularly enrolled student carrying a normal program may audit a course. Others who do not wish to receive credit, or who have not met admission requirements, may also register as auditors. Auditors have no claim on the time or service of the instructor and no grade credit is given for the work. Tuition is charged at the applicable rate. Under no circumstances will a change be made after the enrollment period to allow credit for courses audited.

The approval of the Dean of Evening Division and Summer Session is necessary for auditing courses in those divisions.

Undergraduate Degree Requirements

Degrees are conferred on the recommendation of the several colleges and specific requirements will be found in the sections devoted to the respective colleges.

In addition to the course requirements of the several curricula, students must also fulfill the general requirements in physical education.

To be eligible for graduation, a student must have attained a cumulative average sufficient to meet the minimum requirements for the college in which the student is officially enrolled. Grades in courses accepted for transfer credit are excluded in computing this average.

Every candidate for a degree is required to have taken 30 of the last 42 semester hours of credit in residence at the University except that those who have completed three years of premedical study in the University are awarded their degrees after successful completion of one year of study in any approved college of medicine. Other exceptions to this rule may be made only on recommendation of the Academic Council and in cases of undue hardship. To qualify for a second bachelor's degree the candidate must have fulfilled all the requirements for the degree and must have taken a full year of work, usually thirty hours, in addition to that taken to qualify for the first degree.

Honors

The Bachelor's degree may be conferred with honors, by vote of the Senate, in recognition of general high standing in scholarship. Three grades are distinguished and indicated by inscribing on the diploma the words *cum laude*, *magna cum laude*, or *summa cum laude*. In the College of Medicine, the five students

who have attained the highest average of marks during the entire four years' course are graduated *cum laude*. The names of those who receive these honors and of those who win academic awards are printed in the commencement program.

Dean's List

The deans of the undergraduate colleges publish at the beginning of each semester the names of those full-time students who stood in the top 20% of each class of their college during the preceding semester. Full-time enrollment in this case shall amount to a minimum of twelve-credit hours in courses in which grades of A, B, C, D or F have been given.

Grades and Reports

Grades are reported and recorded as letter grades. Averages are calculated from quality point equivalents.

A	Excellent	4 points per semester hour
B	Good	3 points per semester hour
C	Fair	2 points per semester hour
D	Poor	1 point per semester hour
F	Failure	0 points per semester hour

Penalties for Low Scholarship

The information below describes the general University regulations for low scholarship standing. The Studies Committee of each college may determine additional or supplementary requirements. Students with questions regarding their academic standing should consult with their college dean.

1. "On Trial"—

- a. "On trial" is an intermediate status between good standing and dismissal. The student remains enrolled but under stated academic conditions according to college policies.
- b. Students are placed "on trial" by the dean, or the designated committee of the college concerned, who may also set the special academic conditions of the trial in each case. Normally the period of trial is one semester.
- c. The circumstances under which students are placed "on trial" are as follows:
 - (1) Any student who is readmitted to the University after having been dismissed for low scholarship re-enters "on trial."
 - (2) Generally a student is placed "on trial" if in any semester he has failed half or more of the hours of his enrollment but has been permitted to continue in college.
 - (3) A student whose record has been consistently below the graduating average or generally unsatisfactory in any semester may be placed "on trial" or continued "on trial" even though he does not come within the provisions of section (2).
- d. A student who has earned fewer than thirty semester hours of credit and is "on trial" is barred from participation in all athletic and other student activities.

2. Separation—

- a. A student is dismissed from the University if he receives grades below passing in one-half or more of the semester hours of his enrollment in any

semester unless he is allowed to continue by action of the designated committee.

- b. A student who fails to meet the condition of his trial or whose record has been unsatisfactory and consistently below the graduation average may be dismissed for low scholarship even though he does not come within the provision above.
- c. A student dismissed for low scholarship must address his application for readmission to the college from which he was dropped.

PASS—NO PASS course enrollments have been approved by the University Senate for implementation in September 1968. The action was taken in two parts:

FIRST, that any degree program student, not on academic trial, be permitted to take as many as six courses (or as many courses as he has semesters remaining for future transfer students) during his undergraduate career on a Pass—No Pass basis, beginning in his Sophomore year. These courses may not include any required by the student's major department, either for the major or for the degree. Only *free electives* (without condition) may be taken as pass-no pass. This option may *not* be used for electives within the distribution requirements of a college or department. Students who have enrolled in ineligible distribution elective courses on a pass-no pass basis prior to September 1, 1974, shall not be penalized. The student must complete all work normally required in these courses and he will receive full credit toward graduation for passing them. The instructor will NOT be informed of the student's status and the Registrar will record grades of "D" or higher as PASS and grades of "F" as NO PASS. Neither "P" nor "NP" grades will affect the student's grade-point average.

SECOND, that, in addition, any John Dewey Fellow may be permitted to take all his courses in a given semester on a PASS—No PASS basis, including his required courses. He may do this, after consultation with his adviser, as many semesters as he chooses, beginning in his sophomore year. The instructor will be informed of the student's status and may impose special work requirements for the course. The student will receive full credit for passing these courses. He may request any of his instructors to file a written evaluation of his work (NOT a grade) with the Registrar to be available, at the student's request, to admissions committees, employers, and the like.

The following addition was approved by the Faculty Senate in January 1974: "Physical education (activity) courses, whether taken to fulfill a requirement or as electives, will be available to students on a pass-no pass basis and shall not be counted as part of the six (6) standard courses described above."

Procedure—

1. Obtain a PASS—NO PASS Request Form from the Registrar's Office and consult your academic adviser.
2. Obtain your adviser's endorsement that the request conforms to the policy established by the University Senate. Any question about a course or courses being appropriately elected as Pass—No Pass for a student will be resolved by the student's college dean.
3. Submit your request to be placed on Pass—No Pass status at the Registrar's Office during the first week of the semester. Requests to be removed from that status must be filed during the same period.

NOTE: Non-degree students cannot take courses on pass-no-pass basis.

Repeated Courses

A student who repeats a course loses any previous credit on record for that course. The previous grade is included in computing his cumulative grade average.

Academic Advisers

The policy regarding the selection of academic advisers is determined by each college. Students having questions, or requesting a change of academic adviser, should consult the dean of their college.

Intercollege Transfers

A student who is or has been a member of any college of this University may transfer to another college of the University only with the consent of the deans of the two colleges concerned. In the case of veterans receiving educational benefits through the Veterans Administration, the change must also be approved by the adviser to veterans in the Registrar's Office.

Withdrawal

A student who wishes to withdraw from college must first notify his academic dean in person or in writing. The Registrar must also be notified.

Attendance

Class Attendance—Every student is expected to attend all regularly scheduled classes. This is a major responsibility of the student toward himself and toward the University. The primary penalty for non-attendance lies in the student's lessened grasp of the subject matter of the course.

It is the responsibility of the student to inform the instructor regarding reason for absence from class.

Absence from Classes—Each department is to inform all students in its classes at the beginning of each semester of its policy for handling absences and the penalties that may be imposed.

Failure to do any work for which a grade is given, if due to unexcused absence, may result in a failing grade for that particular work.

Absence from Semester Final Examinations—

1. A student who is absent from an examination for any reason must report that fact and the reason, in person or in writing, to his academic dean within twenty-four hours. If the absence was due to illness, a statement from the University physician must be presented. On the basis of this information, the dean may excuse the absence, in which case the grade is reported as "incomplete," and the student may take the examination at a designated time.
2. If the absence is not reported as described above, or is not excused by the academic dean, the course is recorded as failed.

Priority of University Exercises

University academic responsibilities have priority over other campus events.

Attendance at:

1. Regularly scheduled classes have priority over special scheduled common hour examinations.

2. Common hour examinations have priority over attendance at other activities.

Tardiness

A student not present at the beginning of an exercise may be marked absent.

Right of Appeal

Any student who believes that he has been unfairly treated in regard to absences may appeal to his academic dean.

Other grades are:

Inc. Incomplete. This grade applies to work of acceptable quality when the full amount is not completed because of illness or other emergency. It can be awarded only with the permission of the student's college dean. The dean may set the limit of time when the work of the course is to be completed. In no case shall this time be set longer than the beginning of the corresponding semester of the next academic year.

NP Not Passed, not used in average computation.

P Passed, not used in average computation.

W Withdrawn, without penalty, not used in average computation.

WF Withdrawn, failing. This grade is weighted as an "F" in the computation of averages.

M Grade missing—Not turned in by the Instructor.

Each student, former student, or graduate student may procure transcripts of his record. The charge is two dollars for each transcript.

V The College of Agriculture

The College of Agriculture performs four public functions: it teaches resident students; investigates problems; brings information to the people; and performs related services. These four areas of work are performed by the resident instruction division, the research division (Vermont Agricultural Experiment Station), the extension division (Vermont Cooperative Extension Service), and the Related Services Division.

The curricula of the resident instruction division prepares students for professional careers. Upon receiving the bachelor's degree, students usually enter management, specialized services, education, or research—all these in areas related to agriculture, basic biological sciences, conservation, and international service.

The evolution of society necessitates continual progress and change. Thus the challenge of preparing students to excel now, yet adjust to future changes, is being met through programs designed to give a foundation both in the social sciences and the humanities plus a fundamental technical education.

All programs in the College of Agriculture leading to the Bachelor of Science degree require 120 semester hours of prescribed and elective courses, plus credit for required courses in physical education. The normal semester program includes fifteen to eighteen credit hours of courses plus physical education.

In each area of study certain courses are prescribed, with allowance made for the election of additional courses, to provide a well-balanced and integrated educational program and to insure reasonable concentration. Faculty advisers counsel students in the selection of elective courses and educational problems.

PROGRAMS OF STUDY

The College of Agriculture awards the degree of Bachelor of Science in each of the following programs:

Agricultural Economics
Animal Sciences
Applied Technology and
Agricultural Engineering

Biochemical Science
Biological Science
Botany
Dairy Technology

Environmental Studies
General Studies
Occupational and Extension Education

Plant and Soil Science
Preveterinary Science

The programs are broad and flexible, with sufficient areas of concentration and electives to meet the specific needs and desires of the student. Therefore, responsible departmental advising is important in the development of each student's program. Every candidate for this degree, in consultation with his adviser, must choose one of the above programs upon entering the college. The candidate must then fulfill the requirements stated below.

DEGREE REQUIREMENTS

A. The successful completion of a minimum of 120 credit hours of course work plus credit in required courses in physical education.

B. The successful completion of at least two courses in each of the following areas:

1. Fine arts and humanities
2. Science and mathematics
3. English, speech/drama, and writing
4. Social sciences

C. Courses as specified in individual programs.

Applicability of courses to specific areas will rest with the adviser and, if necessary, with the concurrence of the dean of the college. It is further recommended that courses chosen to fulfill these requirements be taken outside the department in which the student's program of study is located. Students desiring to complete teacher education programs and teacher certification must enroll in appropriate courses in the college of education. (see College of Education and Social Services Advisor—306 Waterman)

Biological Sciences Core

Students initially interested in general biological sciences may enroll in this interdisciplinary core curriculum for the freshman and sophomore years. In addition to general college requirements listed, students must complete during this time the following courses or their equivalents:

Zoo. 9 and Bot. 4 or Biol. 1, 2 (Botany Dept. listings)

Math. 25, 26 or 11

Chem. 3, 16

General Biochem. (Microbiology & Biochemistry 201)

Course descriptions are listed under appropriate department.

Programs or concentrations available upon completion of the core curriculum are listed below. Students who wish to may select one of these more specific offerings during their freshman or sophomore years.

Year

Program

Freshman
Sophomore

Biological Sciences Core

Animal
ScienceBio-
chemical
Science¹Bio-
logical
Science

Botany

Junior
SeniorInsect
Pest
Management²Plant &
Soil
SciencePre-
veterinary
Science³

A description of programs and concentrations follows. They are in alphabetical order along with the other programs of the College.

Animal Pathology

PREVETERINARY SCIENCE Veterinary Medicine today offers more challenges and new opportunities than ever before. Since there are only 19 colleges of veterinary medicine nationwide and some have student contracts with neighboring states, candidates preparing for admission must compete with many applicants with superior grades. Cornell University and the University of Pennsylvania, the two nearest colleges, now require 3 years (90 semester hours) of preveterinary college work. In addition Cornell requires experience with farm animals and applicants are encouraged to work with a practicing veterinarian.

The preveterinary science program leads to the degree of Bachelor of Science. Students with a 3.4 point (B+) average or better may apply to colleges of veterinary medicine at any time after completion of admission requirements. The majority of applicants accepted have the Bachelor of Science degree. Opportunities for graduate veterinarians include large and small animal practice, teaching and research, public health, the armed services, pharmaceutical laboratories, meat inspection, laboratory animal medicine and federal, state and municipal disease control work.

Elective courses are selected in consultation with the faculty adviser. For those who wish to work closely with animals, courses are available in the area of laboratory animal technology. Students with this interest receive special training in

¹See Microbiology & Biochemistry

²See Plant & Soil Science

³See Animal Pathology

the care, management, nutrition and breeding of animals used in scientific research. In addition they are taught basic techniques in animal anesthesia, radiologic techniques, presurgical and postsurgical care, experimental design and laboratory methods for analysis of blood, urine, fecal and tissue specimens. Guest lecturers and small animal hospital experience provide further opportunities. Employment opportunities are available in small animal hospitals, institutions engaged in biological research and with animal colonies associated with the pharmaceutical industry, medical and veterinary schools and state and federal government agencies. Students may also qualify for graduate college if they so desire.

		1st	2nd
The Freshman Year		SEMESTER	
English	Freshman English	3	3
Chemistry 1-2	Intro. Chemistry	4	4
Biology 1, 2	Prin. of Biology	4	4
Math 9	College Algebra	3	—
Math 2	Plane Trigonometry	—	3
	Electives	—	2-5
<i>Note:</i> No electives for 1st semester			

		1st	2nd
The Sophomore Year		SEMESTER	
Chem 131-132	Organic Chem	4	4
Physics 15, 16	General Physics	4	4
Biol. 101	Genetics	3	—
C & T 11	Public Speaking	—	3
	Social Sciences	3	3
	Electives	2-5	2-5

		1st	2nd
The Junior Year		SEMESTER	
Microbiol 201	Genl. Biochem	4	—
An Path 105	Animal Anatomy	3	—
Math 25	Fund. of Calculus	3	—
Microbiol 55	Intro Microbiol	—	4
An Path 106	Animal Diseases	—	3
An Sci 170	Gen. Physiology	—	3
An Sci 246	Adv. Nutrition	—	3
	Electives	6-9	3-6

		1st	2nd
The Senior Year		SEMESTER	
Electives selected in consultation with student's advisor.		16-19	16-19

Animal Sciences

Each student majoring in programs offered within this department shall successfully complete a minimum of eight semester courses in Animal Science, including at least five of advanced standing. Additional courses must be selected in

consultation with the departmental advisers in order that the selected program can be individualized to more nearly meet the professional aims and goals of the student.

DAIRY TECHNOLOGY This program has been designed to provide the scientific, technical, and practical instruction necessary to prepare the graduate for the numerous positions available in the dairy and food science field. The students who elect to place greater emphasis on the scientific aspect of Dairy Technology will find that they are prepared to work in quality control, research laboratories, and to do graduate study in dairy and food chemistry or bacteriology. The student who desires to place greater emphasis on business and the social sciences may become qualified for numerous supervisory and management positions in the dairy and food industry.

BASIC ANIMAL SCIENCE This program has been designed specifically for those individuals who are interested in careers in industrial research and development or university positions. The students who elect this program will be provided with the strong science background that is necessary for advanced study in such areas as physiology, nutrition, genetics, and related biological fields.

ANIMAL TECHNOLOGY This program provides formal training in the theories and practices of the animal sciences with special emphasis on management and technical competence. It prepares the student for employment as a farm owner, manager, or field work with state and federal extension services, breed associations, hatcheries, farm organizations, and various commercial companies.

ANIMAL INDUSTRY This program is primarily for those students who are interested in business. It prepares them for supervisory and management positions in industries related to Animal Science, such as those involved with the processing and sales of dairy, meat and poultry products; feed and fertilizer companies; farm equipment and supply agencies; advertising and public relations; and other areas of public service.

Biological Science

A broad flexible curriculum in biological sciences leading to the Bachelor of Science degree is offered by the College of Agriculture. Students of varied interest and background can be accommodated in this program.

Graduates of the program may elect to continue their education in graduate or medical school or they may choose to work instead. Job opportunities including basic and applied research, administration, and technical writing.

The following courses or their equivalents are required of all students in the program:

Biol. 101 Genetics (see Zoology Dept. listings)

Physics 15, 16

Statistics 111 or 211

In addition, all students must take seven advanced courses in Biological Sciences distributed as follows: two in the area of Ecology, two concerned with Evolution and Diversity of Life, and three in the area of physiology or molecular biology and biochemistry. These courses are selected in consultation with

the adviser from those taught by the departments of Anatomy, Animal Pathology, Animal Science, Botany, Forestry, Geology, Medical Microbiology, Microbiology and Biochemistry, Pathology, Plant and Soil Science, Pharmacology, Physics, Physiology and Biophysics, and Zoology.

Botany

Students in both the College of Agriculture and the College of Arts and Sciences may major in Botany. An undergraduate together with a departmental adviser selects a program suitable to provide a liberal education including broad areas of botanical and other biological sciences, as well as physical sciences. An apprenticeship program in environmental action enables an undergraduate to work closely with a faculty member who is concerned with environmental preservation or planning, and gives the student the opportunity for decision making related to the Vermont environment. Students may choose to prepare themselves for careers that do not require education beyond the Bachelor's degree or they may prepare for graduate education leading to careers in botanical and biological fields such as medicine, dentistry, agricultural biology, biochemistry, environmental sciences, government service, secondary school teaching, and research.

Required courses: Mathematics 11, 12 or 25, 26; Physics 15, 16; Chemistry 16 or preferably 131, 132; Biology 1, 2; Botany 101, 104, 105, and 109 or 160; two additional semester courses in Botany.

Six hours of modern foreign language are strongly recommended. Students may petition the department to substitute other courses for certain requirements in the planning of individual programs.

Environmental Studies

Students interested in Environmental Studies may enroll in the College of Agriculture (See Pages 151-152). They may have a self-designed major in Environmental Studies or they may have a coordinate major in Environmental Studies. Some of the programs in which they may have a coordinate major are: Agricultural Economics, Agricultural Engineering Technology, Animal Science, Biochemical Science, Biological Science, Botany, Dairy Technology, General Studies, Occupational and Extension Education, Plant and Soil Science, and Residential Technology.

General Studies

This program is designed for students seeking a general rather than a specialized knowledge in the field of agriculture and related subjects. Through the proper selection of electives, a student may choose an area of concentration within the college and also select courses that contribute to a liberal education.

Required: In addition to the basic college requirements each student must satisfactorily complete twenty-four hours in the College of Agriculture. All additional courses must be selected in consultation with and have the approval of the student's adviser.

Microbiology and Biochemistry

BIOCHEMICAL SCIENCE Contemporary biology increasingly demands knowledge of events at the molecular level. Students who plan a career of research or teaching in biology are well-advised to concentrate on the principles and methods of biochemistry during their undergraduate years. To this end the program in "Biochemical Science" provides a coordinated sequence of study in chemistry, biology, and biochemistry. Depending on the student's future plans and capability, three areas of concentration are possible: (1) *Cellular Biochemistry* which emphasizes the physiological and metabolic reactions of organisms; (2) *Molecular Biology* which focuses on the chemical and physical structures of subcellular particles; and (3) *Nutritional Biochemistry* which emphasizes the synthesis and utilization of nutrients. Specialization in one of these concentrations normally commences in the Junior Year after completion of the Biological Sciences Core (pg. 75) Students are required to complete a minimum of 3 hours of physical chemistry (or 8 hours for the Molecular Biology option), 12 hours of biochemistry and three advanced biology courses, two of which would be in their specialty (e.g., Nutrition, Physiology, Genetics, etc.).

Plant and Soil Science

The Plant and Soil Science program permits the student interested in horticultural crops, agronomic crops, soils, or insect pest management, as they relate to the production of food, feed, and fiber, or to recreation and the environment, to concentrate in (1) General Plant and Soil Science, (2) Soil Science, (3) Plant Science, (4) Ornamental Horticulture, (5) Landscape Design, (6) Horticultural Therapy, or (7) Insect Pest Management. This program is flexible and provides a liberal education in the biological sciences as a basis for understanding the environment.

All students majoring in Plant and Soil Science must take Principles of Plant Science, Introductory Soil Science, two semesters of Seminar, one semester of chemistry, one semester of mathematics, and one semester of animal sciences. They are also required to take the courses listed in one of the seven concentrations within the program. Courses in other departments may be substituted for one or two of these courses with the consent of the student's adviser. Students interested in research, teaching, and extension careers in science, technology, or vocational education usually select most of their elective courses from the basic biological and physical sciences or from occupational education. Those interested in commercial farming, foreign agriculture, industry, agribusiness, marketing, sales, or production careers usually select their elective courses in animal sciences, resource economics and business administration.

GENERAL PLANT AND SOIL SCIENCE This concentration provides students with a broad training in the area of applied plant and soil science. Students selecting this concentration are required to take P&SS 106 and any four other courses in plant and soil science at or above the 100 level. They must also take three additional advanced courses in plant and soil science, botany, or forestry.

SOIL SCIENCE This concentration prepares students for careers in plant nutrition, soil classification and mapping, soil management and con-

servation, and for positions in the chemical and fertilizer industry. Students concentrating in Soil Science must take P&SS 162, 205, 261, 264, 266, two semesters of chemistry, Bot. 104, and Geol. 1.

PLANT SCIENCE This concentration prepares students for a wide range of careers in agronomy or horticulture. They must take P&SS 106 and any four of the following courses: P&SS 111, 122, 125, 145, 191, or 222 plus any three of the following courses: P&SS 162, 201, 205, 207.

ORNAMENTAL HORTICULTURE This concentration prepares students for careers dealing with the aesthetic and functional aspects of plants as they are used to enhance man's social, psychic, and physical world. Students selecting this concentration must take P&SS 106, 125, 138, 145, 151, 152, Botany 213, Forestry 5, and Art 9.

LANDSCAPE DESIGN This concentration emphasizes the theory and practice of landscape design as it affects community and recreation horticulture, roadside and park management, and landscape design. Students selecting this concentration are required to take P&SS 125, 145, 151, 152, 191, Bot 160, For 5, 134, ME 1 or Art 2, CE 210, HE 295, Art 9, and 106.

HORTICULTURAL THERAPY This concentration introduces students to careers in horticultural therapy in psychiatric institutions, rehabilitation centers, correctional institutions, mental health centers, veterans hospitals, geriatric homes, and retirement communities. Students electing this concentration are required to take P&SS 106, 125, 138, Med Tech 3, Psych 1, 152, Zoo 5, 6, Soc 10, HE 63, Bot 117, and Phys. Therapy 175. Students in this concentration are required to complete four months of supervised therapy training at an approved rehabilitation institution for which 15 hours will be credited for the B.S. degree.

INSECT PEST MANAGEMENT This concentration prepares students for careers in pesticide chemicals research, development and sales, plant pest control, biological control, quarantine, and inspection. Pest management under this concentration emphasizes comprehensive control of pests through chemical, cultural, and biotic practices. Students selecting this concentration must take P&SS 106 or 107, 201, 232, 234, Bot 117, Biol 102, Phar 272, Zoo 209 and 251.

Resource Economics

The Department of Resource Economics offers two major programs of study: the Agricultural Economics program in the College of Agriculture and the Resource Economics program in the School of Natural Resources.

AGRICULTURAL ECONOMICS The objective of the agricultural economics program is to provide students with a strong background in the social sciences and specific training in basic economic theory and the economics of U.S. and World agriculture. Students choose one of three concentrations.

1. **Agribusiness and Marketing:** Courses prepare the student for managerial and sales positions with businesses, especially those that supply agricultural inputs or market agricultural products.
2. **Farm Management:** Courses prepare the student to manage a farm business or to work in the many service or educational fields related to agricultural production and credit.
3. **Agricultural Economics:** A professional program aimed at students who wish to continue their education in graduate school, to participate in agricultural development programs, or to conduct research in the economics of agriculture.

Students in all three concentrations shall successfully complete a minimum of 30 hours in the social sciences. Of these, at least 24 hours shall be in Resource Economics, Economics, or Business Administration, of which 12 hours shall be in Resource Economics courses of advanced standing. All courses must be selected in consultation with the student's departmental adviser.

The number of courses required of all students is purposefully minimal. To be as flexible as possible, the student is encouraged to develop an individually tailored program through the careful selection of electives consistent with his objectives and departmental standards.

RESOURCE ECONOMICS For a description of the program in Resource Economics, refer to the School of Natural Resources.

Vocational Education and Technology

The VOTEC department offers two major programs, (1) Occupational and Extension Education and (2) Agricultural Engineering and Technology which provide an opportunity to choose from nine areas of professional concentration. The programs are flexible. Certain concentrations may be completed either as (1) a major in this department, (2) a dual major when combined with other programs in the University, and/or (3) without having to attend the University campus on a full-time basis. Courses of general interest are available to students majoring in other programs in the University.

OCCUPATIONAL AND EXTENSION EDUCATION Six areas of concentration prepare students for teacher certification. Teaching field minors may be combined with these specializations. Students should contact this department regarding requirements for admission into the University teacher education program.*

One concentration prepares students for educational responsibilities in governmental agencies, private organizations, business, or industry.

*Teacher certification concentrations are offered in cooperation with the College of Education and Social Services. Selected programs have been approved under the Vermont State Department of Education's Program Approval Plan, and have reciprocity certification in selected states. Selected courses in the College of Education and Social Services will be included in teacher certification concentrations.

1. **Diversified Occupations Education:** Prepare to teach life relevant subjects to grade 9-12 special needs pupils, when combined with a teaching field specialization in occupational or secondary education. Students may receive initial certification in secondary special education. Individualized study and field experiences are included.
2. **Health Occupations Education:** Prepare to teach occupationally oriented subjects in grades 10-14. Available only to students who have completed a recognized training program in a health occupation and are licensed. A minimum of two years of experience in a health occupation is required before a degree is awarded.**
3. **Industrial Education:** Industrial Arts and Vocational fields are included in this concentration. Industrial Arts Field—prepare to teach six I.A. subject areas commonly found in grades 7-12. Vocational Field—prepare to teach a specialized trade or industrial subject in grades 11-12. At least two years of acceptable experience in business, industry, or the military is required before the degree can be awarded in the vocational field.**
4. **Natural Resource and Agribusiness Education:** Prepare to teach grades 7-12 general and occupational subjects, and may concentrate their studies in one of the many agricultural or renewable natural resource subject areas. Field experiences in schools are provided during the sophomore or junior year, and the senior year. Professional courses include 152, 155, 251 and 282.
5. **Extension Education:** Prepare for educational responsibilities in government agencies, private organizations, business, or industry by majoring in another program in the University and complete this concentration concurrently. Field practicum experiences are provided. Professional courses include 112, 156, 253 and 295.

AGRICULTURAL ENGINEERING AND TECHNOLOGY This program offers students a choice of two concentrations leading to a Bachelor of Science degree and one which provides the first two years of a Bachelor of Science in Agricultural Engineering degree.

1. **Agricultural Engineering Technology:** Technical and practical instruction related to buildings, utilities, machinery, soil and water; including relevance to problems of environmental concern. Prepare for employment in agribusiness and public service. Courses include 102, 121, 131, 140, and 162.

**Several paths lead either to a degree, teacher certification, or both. A degree may be earned on a full-time basis, or on a part-time basis while employed in industry or teaching. Persons entering teaching directly from industry may earn teacher certification through the Transition Into Education (T.I.E.). Qualified individuals may start as non-degree students and seek admission to a degree program after satisfactorily completing specified courses.

Persons having two or more years of appropriate work or military experience may qualify for up to 30 credits by successfully completing National Occupational Competency Institute Examinations. Students with less than two years experience may qualify for the off-campus technical internship.

Qualified non-degree students seeking teacher certification will usually complete professional courses, 152, 153-154, 157, 158, 159 and 251, plus selected courses in the College of Education and Social Services.

2. Professional Agricultural Engineering—B.S.A.E.: The first two years of a professional engineering curriculum. The last two years of the professional program must be completed at an institution offering a Bachelor of Science in Agricultural Engineering degree. Vermont resident students in good standing may complete their studies at the University of Maine, under a special arrangement which allows them to pay the same tuition rate as Maine residents.

Prepare for professional engineering work in soil and water control, agricultural machinery and equipment, agricultural structures, the application of electricity and refrigeration to agriculture, and rural water supply and sanitation. The graduate is also prepared for research and graduate study in agricultural engineering.***

3. Residential Technology: Technical and practical instruction related to residential construction, site selection, equipment, electricity, water supply and sewage disposal, including environmental and socio-economic considerations.

Prepare for employment in the housing industry and public service. Some areas of employment are: Banks, Farmers Home Administration, Federal Housing Administration, and the manufactured home industry.

***Freshman admission (at the Maine-resident tuition rate) to this curriculum at the University of Maine will be allowed for Vermont-resident students wishing to take all four years at one institution.

The College of Arts and Sciences

The College of Arts and Sciences aims to provide the opportunity for men and women to acquaint themselves with man and his environment: the natural, social and cultural environment and its relationship to man's intellectual and creative achievements; to provide an atmosphere of free inquiry in order to be able to perceive the kinds of alternatives available to man with respect to the problems, challenges and opportunities of life by means of continuous probing, weighing and critical evaluation prior to—but not necessarily in lieu of—choosing courses of thought and action while at the same time recognizing the increasing sense of humility that such learning imposes; above all, to deal with man as man and only secondarily with man as a job description.

The Liberal Arts and Sciences Curricula

The curricula in liberal arts and sciences, leading to the degree of Bachelor of Arts or Bachelor of Science, offers instruction in language, literature, philosophy, religion, the fine arts, the social sciences, the physical and biological sciences and mathematics.

Every candidate for the Bachelor of Arts degree must fulfill the requirements described in sections I and III below, and present a total of 122 semester hours of credit, including 2 semester hours of required courses in physical education. At least 75 of the minimum 122 credit hours must be in subjects outside the major discipline.

Every candidate for the Bachelor of Science degree must fulfill the requirements described in sections II and III below, and present a total of 122 semester hours of credit, plus credit in required courses in physical education.

The Studies Committee of the College will rule upon petitions for exceptions to the College regulations.

The College expects entering students to be able to write correct, clear and effective English, and no student unable to do shall obtain the B.A. or B.S. degree.

A minimum cumulative quality point average of 2.0 is required for graduation from the College of Arts and Sciences. Courses taken on a

pass/no pass basis may not include any required by the student's major department, either for the major or for the degree, or any taken to fulfill distribution requirements of the College of Arts and Sciences.

All exceptions to degree and/or major requirements must be approved by the Studies Committee.

I. Required for all B.A. students

In addition to the two semesters of physical education required of all students by the University, the following distribution requirements must be met: Each student shall present nine semester courses (3 credits, or more each) by choosing *three courses from each of any three of the following categories*:

A. LANGUAGE and LITERATURE

*Chinese	*Hebrew	*Russian
English	*Italian	*Spanish
*French	*Japanese	
*German	*Latin	
*Greek	Literature in translation	

No more than two of the three required courses may be chosen from any one discipline. Students may not fulfill the requirement without offering a foreign language at the intermediate level or above.

B. FINE ARTS and PHILOSOPHY

art	music	philosophy
theatre	communication	religion

No more than two of the three required courses may be chosen from any one discipline.

C. SOCIAL SCIENCES

anthropology	history
economics	political science
geography	psychology
sociology	

No more than two of the three required courses may be chosen from any one discipline.

D. SCIENCES and MATHEMATICS

biology	geology
botany	physics
chemistry	zoology
mathematics	

No more than two of the three required courses may be chosen from any one discipline. (Biology, botany and zoology are considered one discipline)

*Intermediate level or above.

NOTE: Linguistics 101, 102 may be considered as meeting the distribution requirements of category A or B or C at the student's option.

MAJOR FIELD Each student, in consultation with his adviser, must choose a major field during his sophomore year. The specific courses making up the field, as well as the student's entire program for the last two years, are chosen in consultation with the chairman of the department in which the major part of the work is to be taken and must have his approval. The following minimal requirements must be met.

1. The field must be a well integrated whole, adapted to the student's special interest.
2. It must include a minimum of 36 semester hours, at least 18 of which must be in the major discipline. Concentration requirements, including courses and necessary prerequisites may not exceed 60 semester hours, not more than 45 of which may be required in the major discipline. Transfer students will be expected to complete as matriculated students in the College of Arts and Sciences at least one-half of the courses that are required in their major discipline.
3. Courses taken to fulfill distribution requirements may also be counted toward the major credit requirements.
4. Students are required to obtain a minimum grade of C in all courses required for their major.

INDIVIDUAL DESIGN MAJOR For those students whose needs and interests are not met by the major programs currently offered in the College, there exists the option for the student to initiate a non-departmental major chosen from among the various offerings in the College and tailored to their individual needs. The program must be sponsored by a faculty member and approved by the College Honors and Individual Studies Committee and presented in the student's sophomore year.

II. Specific Departmental Requirements for B.A. Majors

ANTHROPOLOGY Anthropology 21 and two of the following three: 24, 26, 50; and 225 and 290 (normally taken in the senior year); four other advanced courses.

AREA AND INTERNATIONAL STUDIES Entering students are invited to consider the *option of concentrating in Area & International Studies*. Courses in several academic disciplines can be combined so as to focus on a particular area of the world, thus providing an opportunity to test generalizations against the particular reality of a geographical area and its people.

In addition to regular classroom work, the Center for Area & International Studies helps to make it possible for students to spend part of their college career in actual residence in a foreign area. At present, for example, UVM students are located in Scandinavia, Austria, France, Africa, Japan, and the Caribbean. Other possibilities are being explored.

Undergraduates who major in Area Studies usually accumulate sufficient credit to enable them to also fulfill departmental requirements in one of the social sciences, humanities, or foreign languages.

The five areas presently available for concentration are: ASIA, CANADA, LATIN AMERICA, RUSSIA/EAST EUROPE, EUROPE (Western, Northern, Mediterranean).

This relatively novel method of undergraduate education combines exposure to the traditional disciplines with integrative knowledge and appreciation of a foreign culture and thus combines the broad liberal arts education with a more specific area competence.

Students who plan on majoring in Area Studies should take during their freshman and/or sophomore years the required foreign language courses of the selected area as well as such beginning courses in the social sciences and humanities which are prerequisites of subsequent required courses and do also meet the general distribution requirements.

Students interested in concentrating in Area Studies are urged to contact the advising representative: Professor Jeremy P. Felt, Director, Area & International Studies, Extension 4062.

Specific requirements of the individual programs are as follows:

ASIAN STUDIES Asian area studies majors will concentrate on one of three major geographic areas in Asia—West Asia (the Middle East); South and Southeast Asia; and East Asia (China and Japan). Special arrangements can be made for students wishing to concentrate on studies of Central Asia.

Courses relating specifically to the three areas are listed below. In addition "Readings and Research" courses (numbered 197, 198) are regularly offered to students at an advanced level; and "Special Topics" courses (numbered 195, 196, 295) on Asian areas are occasionally offered by various departments and may be taken to fulfill the major requirements. There are also courses such as Economics 216, "Economic Development", and Economics 258, "Problems of Communism", which cut across geographic lines and may be applicable to the students' program.

The Asian Area Studies major will choose an advisor from the faculty in the area of his particular interest, and work out a program with him.

WESTERN ASIA

- I. Twelve hours of courses at the 100 or above level, which deal specifically with the Middle East:

Anthropology 166	Peoples of the Middle East
Anthropology 170	Pastoral Peoples
History 105	History of the Ancient Near East
History 195	The Rise of Islamic Civilization
History 195	Arab-Israeli Conflict
Religion 141	Hebrew Scriptures
Religion 142	Post-Biblical Judaism
Religion 145	Primitive Christianity

- II. An additional twelve hours from courses included in the Asia Studies Program. The student may apply six hours of a Middle Eastern language to this requirement. At present the University offers two years of Hebrew. Students who study Arabic, Persian, or Turkish at other accredited institutions may petition to apply credits earned to this requirement, or they may take a language proficiency test.

- III. An additional twelve hours from related courses, chosen in consultation with advisor.

SOUTH AND SOUTHEAST ASIA

- I. Twelve hours of courses at the 100 or above level which deal specifically with South and South east Asia:

Anthropology 163	Peoples of Southeast Asia and Oceania
Anthropology 165	Peoples of South Asia
Area & Int'l Studies 195	Asian Literature in Translation
Area & Int'l Studies 196	Introductory Sanskrit
Area & Int'l Studies 295	China and India in Modern Times
Geography 109	South Asia
Political Science 176	Asian Political Systems (India)
Political Science 196	Indian Politics and Society
Religion 161	Hindu Tradition
Religion 166	Buddhist Tradition (Religion 21, Introduction to Asian Religions, is recommended as a prerequisite)
Religion 195	Man and Nature in East and West

- II. An additional twelve hours from courses included in the Asian Area Studies Program. The student may apply six hours of an appropriate language (e.g., Hindi, French, Arabic) if they have studied them at an accredited university; or they may take a language proficiency test.

- III. An additional twelve hours from related courses, chosen in consultation with advisor.

EAST ASIA

- I. Twelve hours of courses at the 100 or above level which deal specifically with East Asia:

Area & Int'l Studies 195	Asian Literature in Translation
Area & Int'l Studies 195	Ancient Chinese Literature
Area & Int'l Studies 196	Modern Asian Fiction
Area & Int'l Studies 295	China and India in Modern Times (A comparative study) (credit given for history and political science)
Geography 108	Geography of East Asia
History 271	Modern China (1800-1949)
History 272	Contemporary China (1949-present) (History 73, 74, East Asian Civilization, is recommended as a prerequisite)
Philosophy 195	Philosophical Taoism
Philosophy 221	I-Ching (Philosophy 23, Introduction to Oriental Philosophy, is recommended as a prerequisite)
Political Science 175	Asian Political Systems (China, Japan)
Religion 166	Buddhist Tradition
Religion 175	Chinese Religion and Thought
Religion 171, 172	Japanese Religion

- II. Eight hours of Chinese or Japanese language at the intermediate level

Chinese 1, 2	Elementary Chinese
Chinese 11, 12	Intermediate Chinese

Chinese 21, 22	Introduction to Classical Chinese
Chinese 195, 196	Advanced Intermediate Chinese
Chinese 195	Intermediate Classical Chinese
Japanese 1, 2	Elementary Reading and Conversation
Japanese 11, 12	Intermediate Reading and Conversation
Japanese 21, 22	Tutorial Readings

- III. An additional six hours from courses in the Asian Area Studies Program plus 10 hours from related courses selected in consultation with advisor.

CANADIAN STUDIES

- I. Twelve hours selected from the following courses:

History 213, 214; 215, 216
 Geography 102, 221
 Political Science 173
 English 135 or 136
 Anthropology 167
 Economics 197
 Sociology 197
 Comm. & Theatre 197 (Canadian Speakers, Canadian Theatre), 263 International Comm. (Canada)
 French language through the intermediate level

- II. Two additional semester courses from Area & International Studies 193, 194; 195, 196; 197, 198; 297, 298; or courses recommended by the Program of Canadian Studies.

- III. An additional 18 hours from related courses, chosen in consultation with advisor.

LATIN AMERICAN STUDIES

- I. Twelve hours as follows:

Anthropology 161
 Geography 106
 History 104
 Political Science 174

Two additional semester courses selected from Area & International Studies, 193, 194; 195, 196; 197, 198; or 297, 298; or from courses recommended by the Program of Latin American Studies.

- II. Plus six hours of advanced Spanish (Spanish 161, 162 or 271, 272)

- III. An additional 12 hours from related courses chosen in consultation with advisor.

RUSSIAN/EAST EUROPEAN STUDIES

A minimum of 21 semester hours selected from the following courses:

Economics 11, 12 and 290 or 291
 Geography 103
 History 11, 12 or 52 and 243 or 244
 Political Science 172

Six (6) additional semester hours from the above list and/or other courses

recommended by the Program of Russian and East European Studies. Twelve (12) semester hours of Russian to include Russian 11, 12, 101 and 102 unless Serbo-Croatian is selected.

EUROPEAN STUDIES (Northern, Western, Mediterranean)

- I. At least eighteen hours of advanced courses in one European Area or Topic determined through consultation with an advisor and approval of the European Studies subcommittee of the Area & International Studies Program. (e.g. Medieval and Renaissance Studies).
- II. Fifteen hours of additional advanced courses related to Europe.
The total of A and B shall include nine hours of advanced courses in European Literature and Fine Arts and nine hours of advanced courses in Social Science relating to Europe.
- III. Six hours of a European foreign language related to the area or topic of A and at the 200 level. Those who have concentrated on a foreign language in A shall offer six hours of a second foreign language at the 100 level or above in addition to the requirements of B.
Variants in the language requirement may be made by the advisor, depending upon the area of interest. (e.g. Ancient/Medieval History or Archaeology, where an ancient *and* a modern language would be required.)
- IV. The student would, of course, also fulfill the Arts and Sciences general distribution requirements and would be encouraged to do so through a broad selection of courses dealing with Europe.

ART Students may concentrate in one of the following:

STUDIO ART Twenty-four hours in studio, including three courses chosen from 1, 2, 3, 4 with three different instructors, four at the 100 level, and 281 or 282 in the senior year; nine hours in Art History, including 109 preceded by either 5, 6 or 9, 54; and six hours of related advanced critical, social or creative studies.

ART HISTORY Twenty-four hours in art history, including 5, 6; four courses at the 100 level and two at the 200 level, one of the latter in the senior year; six hours in the department chosen from 1, 2, 3, 4, 9; nine hours of related advanced historical and/or critical studies; and satisfaction of Group A in college requirements.

BIOLOGY Chemistry 1, 2 or 11, 12 to be taken the freshman year if possible; Physics 11, 12 or preferably 15, 16; Mathematics 25, 26, or 11, or 110, or 200; Biology 1, 2, 101, 102, 103; Zoology 104, Botany 105; plus three advanced courses selected in consultation with the advisor from among the offerings of several departments.

BOTANY Mathematics 11, 12 or 25, 26; Physics 15, 16; Chemistry 16 or preferably 131, 132; Biology 1, 2; Botany 101, 104, 105, and 109 or 160, and two additional semester courses in Botany. Six credits of modern foreign language are strongly recommended. Students may petition the department to substitute other courses for certain requirements in the planning of individual programs.

CHEMISTRY Chemistry 11, 12 (or 1, 2 and 123), 131 (3 credits), 132 (3 credits), 134, 135, 141, 142, 201, 202 and 212; Mathematics 13, 14 and 123 (or equivalent); Physics 15, 16 or 24, 25.

COMMUNICATION AND THEATRE Students may choose one of four options:

Communication and Public Address: 11; seven advanced level courses (at least three of which must be at the 200 level), in Communication and Public Address; two additional courses in the department; plus nine hours of related courses.

Mass Communication: 63; eight advanced level courses (at least five of which must be at the 200 level), in Mass Communication; plus nine hours of related courses.

Speech pathology-audiology: one from (11, 14, 31, 41, 81), 74, 101, 270, 271 or 272, 273, 281, one additional course in the Department; plus eleven hours of related courses.

Theatre: 39, eight additional courses in the Department; four of which must be at the advanced level; and five of which must be in Theatre; plus nine hours of related courses.

ECONOMICS Twenty-seven hours in Economics including 11, 12, 186, 188, 190, 285 or 295 and three courses from the Economics list which are numbered 100- or above. In addition, 12 credits chosen from among the following disciplines: anthropology, geography, history, mathematics, philosophy, political science, psychology, religion, sociology.

ENGLISH Twenty-four hours of advanced courses distributed according to departmental group requirements; satisfaction of the Group A College requirement; 12 hours (6 in courses numbered 100 or above) in a related field; students are encouraged to take advanced courses in history and classical and modern foreign languages and literature.

ENVIRONMENTAL STUDIES Students in the College of Arts and Sciences may select a major in the Environmental Program. Consult the appropriate section of this catalog.

GEOGRAPHY Twenty-seven hours in Geography (including Geography 11, 12, 171, 281, an additional six semester hours at the 200- level and nine other semester hours in Geography); four semester courses in approved related fields.

GEOLOGY Twenty-seven hours of Geology, including twelve hours at 100 level, and nine hours at 200 level. Twelve hours in Physical Science, Biological Science, Mathematics (Calculus or above), or Engineering. Field experience strongly recommended.

GERMAN Eight semester courses of advanced level including 101, 102 plus the senior seminar; four semester courses of English; two semester courses of European history to be selected from 11, 12, 13, 233, 234, 235, 236; an advanced related course to be selected in consultation with the department.

GREEK Twenty-seven hours in courses numbered above 10 among which 111, 112 are required and one course in literature in translation numbered

above 100 and one course in Latin above 100 are applicable. Also: History 106, Greek History. A second foreign language: either six hours of Latin at least through the intermediate level or six hours of a modern European language of which at least three hours are at the 100 level or above.

HISTORY Twenty-seven hours (12 at the 100 level or above, including at least 6 at the 200 level), 6 hours in history outside the area of the United States; one foreign language through the intermediate level or a year of statistics and quantitative methods; 12 hours in another discipline approved by the department or within one of the areas taught in area studies. History 3 is recommended for majors. Every history major must submit to the department an acceptable research paper in history (which may have been done in one of his courses) by the end of his first senior semester.

LATIN Twenty-seven hours in courses numbered above 100 among which 111, 112 are required and one course in literature in translation numbered above 100 and one course in Greek above 100 are applicable. Also: History 107, Roman History. A second foreign language: either six hours of Greek at least through 12 or six hours of a modern European language of which at least three hours are at the 100 level or above.

MATHEMATICS Thirty-six semester hours of courses numbered 11 or higher, including 102, 124 and fifteen additional semester hours in courses numbered 200 or above.

MUSIC 1, 2, 5-6, 105-106, 221, 222 and six hours of performance study including piano; six hours in another discipline as approved by the department. Students who wish to meet accreditation requirements of the National Association of Schools of Music will also complete one of the following combinations:

(a) 203, 205 and four advanced courses in music literature

(b) 203, 205, 208, 215 and two advanced courses in music literature.

(c) 208, advanced course in music literature and twelve additional hours of performance study.

A senior recital is required of all students majoring in music. One foreign language through the intermediate level is required of students on combinations (a) or (b).

PHILOSOPHY Twenty-four hours including 3, another course under 100; 101, 102, 103, and three 200 level courses. An additional twelve hours in a related discipline or disciplines is required. Students considering graduate work are urged to study a foreign language.

PHYSICS Twenty-five hours in physics, including 15, 16, or 24, 25; 128, 201 (not required of students taking 220 and 222 with laboratory), 211 and 213; mathematics through 121 or 123. An additional laboratory science and a reading knowledge of French, German or Russian are strongly recommended.

POLITICAL SCIENCE Twenty-seven hours including nine hours selected from the "core" courses (13, 21, 51, 71, 81) and fifteen hours at the

level of 100 or above, of which at least nine hours must be at the 200 level; nine hours in a related discipline, of which six must be in courses numbered 100.

PSYCHOLOGY Requirements for the major in psychology are Psychology 1, 109, 110, 119, and 12 additional credit hours in Psychology as specified by the department; and 10 additional credit hours in the social and natural sciences.

The department currently specifies that of the 12 additional hours in psychology, a *minimum* of 6 must be in courses numbered 200 or above.

RELIGION Twenty-seven hours in religion, including 71; two courses chosen from among 101, 112, 122; one course from the 140-159 range; one course from the 160-179 range; 201; plus nine hours in a related discipline.

ROMANCE LANGUAGES Thirty hours of advanced level courses in French or Spanish, of which at least twelve must be in literature and at least twelve must be in courses numbered above 200. Related area: a minimum of twelve hours of courses from another department or departments, chosen in consultation with departmental major advisers and specifically approved by them.

RUSSIAN Ten semester courses at the advanced level to include 101, 102, 103, 104, 203, 204, 271, 272, 281, 282, four semester courses of another language which may consist of combinations of 2 semester courses in English or comparative literature and two semester courses of a foreign language at the 11, 12, level (Serbo-Croatian is strongly recommended for this requirement), plus three semester courses from the Russian and East European Area Studies program (chosen in consultation with major advisor).

SOCIOLOGY The Class of 1974 and those in the Class of 1975 who so elect: A minimum of ten courses (30 credits) in sociology and two courses (6 credits) in the related fields of anthropology, economics, geography, history, political science or psychology. The courses in sociology must include 10, 100, 275 and 278 (formerly 22, 250, 251 and 255).

The Class of 1976 and all subsequent classes, and those in the Class of 1975 who so elect: Thirty hours in sociology, including a minimum of fifteen hours at the 200 level and six hours in the related fields of anthropology, communications and theater, economics, geography, history, political science or psychology. Required courses include 100, normally taken by the end of the sophomore year, and one of the following: 273, 274, 275, 278 or 279.

ZOOLOGY One semester of calculus; Physics 11, 12 or preferably 15, 16; Chemistry 1-2 or 11-12 to be taken the freshman year if possible; Biology 1, 2; 101, 102, 103; Zoology 104; plus seven hours chosen from Biology 105, and 200 level Zoology courses.

Special Provisions Concerning Credit

Courses offered in other colleges or divisions of the University of Vermont by departments which offer a major in Arts and Sciences (as approved by the Faculty of Arts and Sciences) receive full credit toward the B.A. degree. Courses offered in

other colleges or divisions of the University by departments which do not offer a major in the College of Arts and Sciences may be taken without any limitation by Arts and Sciences students, but *only 24 semesters hours of such courses may be applied to the minimum 122 credits required for the B.A. degree.* (At the present time, majors in departments outside the College are available in Botany and Mathematics). A minimum of 30 of the last 42 hours must be taken in residence as a degree student in the College of Arts and Sciences.

III. Required for all B.S. Students

In addition to the two semesters of physical education required of all students by the University, the following distribution requirements must be met: Each student shall present 6 semester courses (3 credits or more each) selected from at least two of the categories listed below. These categories must be outside the category of the student's major. Departments may specify categories and/or courses (see Specific Departmental Requirements for Majors, below).

A. LANGUAGE AND LITERATURE

English	Hebrew	Russian
French	Italian	Spanish
German	Latin	
Greek	Literature in Translation	

B. FINE ARTS AND PHILOSOPHY

Art	Music	Philosophy
Theatre	Communication	Religion

C. SOCIAL SCIENCES

Anthropology	History
Economics	Political Science
Geography	Psychology
Sociology	

D. SCIENCES AND MATHEMATICS

Biology	Geology
Botany	Physics
Chemistry	Zoology
Mathematics	

NOTE: Linguistics 101, 102 may be considered as meeting the distribution requirements of Category A or B or C at the student's option.

MAJOR FIELD Each student, in consultation with his advisor, must choose a major field during his sophomore year. The specific courses making up the field, as well as the student's entire program for the last two years, are chosen in consultation with the chairman of the department in which the major part of the work is to be taken and must have his approval. The following minimal requirements must be met:

1. The field must be a well integrated whole, adapted to the student's special interest.

2. It must include a minimum of 36 semester hours, at least 18 of which must be in the major discipline. Courses required in the major discipline may not exceed 50 semester hours. No more than 50 semester hours in the major discipline may be counted for graduation. No more than 94 semester hours of the total program, including distribution requirements and major field, may be in specifically designated courses.
3. Courses taken to fulfill distribution requirements may also be counted toward the major credit requirements.

IV. Specific Departmental Requirements for B.S. Majors

Departmental Requirements for B.S. Major

CHEMISTRY Chemistry 11, 12, 131 (3 credits), 132 (3 credits), 134, 135, 141, 142, 184, 201, 202, 212, 213, nine hours of advanced chemistry or biochemistry electives, which may include Chem 197, 198; Physics 15, 16 or 24, 25; Math 13, 14, 123 (or equivalent), Math 271; proficiency in German equivalent to the completion of Intermediate German (German 15, 16). (In special cases, upon petition to the department, a student may be allowed to substitute equivalent proficiency in French or Russian for German).

Preprofessional Preparation

Students who plan to enter professional colleges requiring previous collegiate preparation will find the variety of courses offered in the College of Arts and Sciences and the freedom of election in that college is such that all the requirements for any professional school may be met. Many students will desire so to direct their four-year undergraduate courses as to provide, in addition to a sound general education, appropriate preprofessional training for later work in the medical sciences, law, or theology.

Special advising is available in the College for students preparing for careers in education, journalism, law, and medical sciences.

BIOLOGY A major in Biology is offered to students enrolled in the College of Arts and Sciences. It has been designed for the student who wishes to concentrate in Biology while pursuing a liberal arts education. It will also serve as a basis for programs leading to graduate study in biological fields and as an appropriate major for students in premedical and predoctoral programs.

The concentration consists of a year of elementary biology and single-semester courses in genetics, ecology, cellular biology, animal structure and function, and plant structure and development. This core is followed by three elective courses selected from a wide range of offerings in biologically oriented departments at the University. A year of chemistry, a year of physics, and mathematics (calculus or statistics) are also required.

JOURNALISM Admission to schools of journalism is generally open to academically qualified students who hold the Bachelor of Arts degree with concentration in any discipline. Interested students should take a broad program in the liberal arts, including work in the social sciences, in mass communication, and in English.

LAW American law schools, as a rule, require graduation from a four-year college with a Bachelor's degree prior to admission. There is no prescribed curriculum which is requisite for admission, but the student is advised to develop a command of the English language as well as a comprehension of American politics, social, and economic institutions. For further details, kindly consult Professor L. J. Gould, Department of Political Science.

THEOLOGY Graduation from a four-year college is prerequisite for admission to most theological seminaries. Although no prescribed curriculum is demanded as preparation for such professional schools, the student is advised to elect substantially from the departments of languages (particularly classics), history, philosophy and religion, psychology, and social studies.

OPTOMETRY The requirements for admission to schools of optometry vary, but typically they include courses in English, mathematics, physics, chemistry and zoology with a minimum of two years of college work.

PHARMACY Under the Regional Plan (page 37) Vermont residents may prepare for pharmacy school at Connecticut or Rhode Island. This is a five-year program with two years of preprofessional work which includes English, mathematics, botany, chemistry, zoology, physics, social science, a course in fine arts, and orientation to pharmacy.

MEDICINE AND DENTISTRY The prevailing requirements for admission to an accredited medical college include a minimum of three years of undergraduate work but most institutions recommend four years. It is strongly urged that a student desiring to enter medical college should during his sophomore year consult catalogues of colleges to which he expects to apply, and arrange to include in his program courses required by those schools.

Each student, in consultation with his adviser, plans a four-year program of courses which will fulfill the requirements for a Bachelor's degree. To meet the *minimum* requirements of most medical colleges, the program should include the following:

Mathematics, one of the following options:

- a) Mathematics 11, 12 (recommended for able students)
- b) Mathematics 25, 26 (recommended)
- c) Mathematics 11 (adequate)
- d) Mathematics 9, 11 (adequate)
- e) Mathematics 9, 2; 11 or 25, 26 (suggested for students not immediately prepared to enter calculus)
- f) Mathematics 7, 8 (not acceptable)

Chemistry, two years minimum, *with laboratory*

Chemistry 1-2 or 11-12 (recommended for potential Chemistry majors)

Chemistry 131, 132 (required)

Physics, one year minimum, *with laboratory*

Physics 15, 16 or 24, 25 (recommended for students concentrating in the physical sciences or engineering)

Biology, one year minimum, *with laboratory*

Biology 1, 2

Students who enter an accredited medical college after three years (90 hours) of undergraduate work may, on application and after completing one year of medical study, qualify as candidates for a Bachelor of Science degree.

The requirements for admission to colleges of dentistry vary, but in all cases include at least two years of college work. In general, the minimum requirements given above should be used in planning a program leading to entrance into a dental school. A student should consult catalogues of the dental colleges to which he expects to apply in order to make certain all requirements are met.

In general, students should avoid taking courses at the undergraduate level in those areas taught at the professional level: i.e., human anatomy, human physiology, microbiology, biochemistry. Many medical colleges now strongly recommend or require that students enroll in courses in the humanities and social sciences.

SECONDARY TEACHING Students in the College of Arts and Sciences may, upon application to the Dean of Education, be accepted into the teacher training program for secondary education. Application should be made before the end of the sophomore year. The prescribed courses in education, including student teaching, can count as electives in the Arts and Sciences program (utilizing the right to count 14 hours in non-Arts and Science courses plus certain education courses that can be counted without restriction). Students completing this program are eligible for Secondary Teacher's Certification.

College Honors

The honors program at both the junior and senior level is designed for the superior student with unusual initiative and intellectual curiosity, and provides an opportunity to pursue a special project without the restrictions of classroom routine. Such a student enters a program of reading, research, or creation under the direction of the department of his choice. A student may take honors in either or both years.

A student in the College of Arts and Sciences who, at the end of his junior year, has an average of 3.00 or above for the work of the sophomore and junior years may become an applicant for college honors in a particular subject. His program for the senior year must be approved not later than the end of the junior year by the department in which honors are sought and by the Committee on Honors, and he must present a satisfactory written report and pass an oral examination on the field of special study.

A program called junior honors, which may be considered introductory to but distinct from college honors, is available to juniors who have a sophomore average of 3.00 or above and who have the permission of their department chairmen. The program for each junior honors candidate will be determined by the department concerned.

Departmental Honors

A senior whose overall average is 2.50 or above, or who has been specially recommended by the department in which he is concentrating, is eligible to take a comprehensive examination. Upon successfully completing the examination he will be granted his degree "with Departmental Honors." Some departments have instituted seminars or other programs designed to help the student gain the requisite breadth and depth of knowledge.

The Center for Area Studies

The Center for Area and International Studies is an inter-departmental activity conducted by the Committee on Area Studies. The chairman of the Committee serves as Director of the Center.

The purposes of the Center are to encourage and coordinate interdisciplinary and comparative study and research for selected foreign areas. The Center sponsors also interdisciplinary seminars and guest lectures and helps to arrange overseas faculty exchanges and visitations. In addition to regular classroom work, the Center for Area & International Studies helps to make it possible for students to spend part of their college career in actual residence in a foreign area. At present, for example, UVM students are located in Scandinavia, Austria, France, Japan, and the Caribbean. Other possibilities are being explored.

The Center for Area Studies administers the program of concentration in Area Studies and offers the B.A. degree in the College of Arts and Sciences, based on the successful completion of courses in several academic disciplines with concentration in one of the five foreign areas: Asia, Canada, Europe (Western), Latin America, and Russia and Eastern Europe. For the general requirements for concentration in Area Studies see under the Liberal Arts curriculum.

Undergraduates interested in taking Area Studies should consult as early as possible in their college careers, the Director of the Committee on Area Studies and/or the directors of the individual programs. The Center is located at 479 Main Street.

Undergraduates who select to major in Area Studies usually accumulate sufficient credits enabling them to also fulfill departmental requirements in one of the social sciences, humanities, or foreign languages.

Study Abroad

The office of the Coordinator of Overseas Programs at 479 Main Street maintains information about overseas study programs and conducts arrangements for foreign study with the student's academic advisor and his/her dean. The office also assists in the evaluation of credits for study abroad. Students interested in overseas study are urged to contact the Coordinator's office.

In addition to providing information about hundreds of overseas study programs, the university offers the following programs in which it has a direct involvement:

—*The Vermont Overseas Program at the University of Nice in France* provides a year of study abroad for a selected group of undergraduates from the University of Vermont and from other colleges and universities. Intended primarily for students concentrating in French, the program is also open to qualified students from other fields, such as the fine arts or the social sciences. Student selection will be based on the following criteria:

1. Sophomore, junior or senior class standing with a minimum grade point average of 2.0 (C).
2. A working knowledge of French.
3. An interest in and potential for capitalizing on a year of study abroad.
4. A sound educational program.
5. Creditable personal qualifications

Upon the successful completion of his/her work, the student receives appropriate credit (usually thirty hours) toward his/her degree. For further information about the Vermont Overseas Study Program, an interested student should speak to his/her academic dean or to the director of the program.

—The University is a member of the *Intercollegiate Center for Classical Studies in Rome*. Properly qualified students may attend one or two semesters at the Center and receive full credit. For further information consult with the chairperson of the Department of Classics.

—*The University of Vermont French Canadian Studies Program at the University of Quebec, Three Rivers campus*: A six weeks course of study designed to acquaint American students and teachers with the distinctive cultural, social, and political features of French Canada. The program will offer a total of six credits in advanced French language, in French Canadian Literature, and in a sociological-historical and geographical study of French Canada. All instruction will be carried on in French and both undergraduate and graduate credit will be available. For further information contact the Department of Romance Languages.

—*Issues in Contemporary Education: Seminar Abroad-Education in England* This program is designed to offer students something more than the usual "study abroad" program. It offers an opportunity for each student to relate his or her professional needs, interests, goals, and aspirations to a specific educational program. There will be opportunities to visit many areas of cultural and personal interest. In addition, the student will live with a family in England and work as a paraprofessional in one or more of the host nation's schools. Time allowed for independent travel. Participants will be affiliated with a teacher training college in England. Contact David Shiman, College of Education.

—*Scandinavian Seminar*: A total cultural immersion program consisting of a year's study in folk schools in Norway, Denmark, Sweden, or Finland. No prior language competency required. Apply to this national program through the Coordinator's office.

—*Caribbean program*. Individual placement of small numbers of students in this area of the world is being developed.

The Government Research Center

The Government Research Center, established in 1950 as the Government Clearing House, provides research and informational services for students, state and local officials, members of civic groups, and the public. Activities include the following: developing opportunities for students to become acquainted with, and to gain practical experience in, the operation of government; maintaining liaison with state and local officials relative to the use of University resources in the study of problems in state and local government; operating a public affairs research center, conducting research projects, and publishing studies in state and local government; and preparing background materials for conferences on public questions.

Many of the activities of the Government Research Center are sponsored in cooperation with state officials, local officials, or civic groups. The annual Listers' Schools are sponsored jointly with the Governor and the Vermont State Tax Department. Many state and local officers participate in the series of one-day Town Officers Educational Conferences, which originated in the late 1930s and which are held annually in several locations throughout Vermont. A two-day conference on citizenship, in which high school juniors, high school faculty members and

administrators, and University personnel participate, has become an annual event, with the cooperation of the State Department of Education and various educational associations.

A Public Affairs Library collection is maintained as a memorial to the late James P. Taylor, whose effort to expand citizen interest in effective government is well known throughout the State. The Government Research Center also sponsors the annual Taylor Town Report Contest in Vermont and cooperates with the New England Council relative to the region-wide contest.

The Government Research Center is a program of the Department of Political Science.

The Experimental Program

The Experimental Program of the College of Arts and Sciences is based on the residential college concept of decentralized university work. Students selected for the program live in a designated dormitory complex and take a special instructional program rooted in small seminar groups. Students receive descriptive evaluations of their work and are graded on a Pass/No Pass basis. The normal course load is four courses per semester, at least two of which must be Program courses. The remainder may be conventional courses taken elsewhere in the university. Students are encouraged to explore subjects in depth. To meet the unique needs and interests of students, the Program encourages qualified students to make independent studies and public service internships a part of their academic program. Upon successful completion of two year's work in the Program—which is defined as passing sixteen courses—students are awarded 60 credit hours and the distribution requirements in Arts and Sciences are considered satisfied. Students then take regular Arts and Sciences courses and complete departmental majors during their junior and senior years. Generally, specific departmental major requirements and advanced course prerequisites can still be met in the student's final two years.

Students are admitted to the Experimental Program by invitation, on the basis of a random sample of the entering freshman class in the College of Arts and Sciences. Invited students are not obliged to enroll in the Program, and those who do enroll may transfer to the regular program at the end of any semester, with credit pro-rated on the basis of a maximum of 15 credits per semester.

V College of Education and Social Services

The College of Education & Social Services offers four-year curricula leading to the following degrees: Bachelor of Science, Bachelor of Science in Education, Bachelor of Science in Music Education, and Bachelor of Science in Art Education.

Undergraduate Programs are offered in:

Art Education—Gr. K-12

Elementary Education—Gr. K-12

Music Education—Gr. K-12

Physical Education—Gr. K-12

Secondary Education—Gr. 7-12

Social Work

These curricula are designed to prepare teachers for the kindergarten-elementary level, junior high schools, and assignments calling for subject specialities in elementary, secondary, and twelve-grade situations. Programs are composed of general education, professional education, and professional laboratory experiences.

The College of Education & Social Services is developing an experimental approach in the area of reading-language arts, early childhood, and special education. The American Primary Experimental Program is an experimental professional program that prepares teachers for grades kindergarten through third (K-3). Any student who desires early childhood education certification endorsement, must be enrolled in the College of Education & Social Services. The faculty-student advising process individualizes the program to the student's specific interests and career goals. Upon completion of their sophomore year, students may enter one of these specialized programs for the last two years of their undergraduate career. Additional information may be obtained from Mr. Zacharie Clements—Reading and Language Arts; Mr. Charles Rathbone—Early Childhood and APEX; and Mrs. Ann Egner—Special Education. Programs are also available for individually designed majors and for careers in interdisciplinary Social Services and Education. Other programs such as open classroom, and middle school preparation are also in the discussion stage.

Effective with the Class of 1977 the required graduation cumulative average is 2.0. It is required that students achieve a cumulative average of 2.50 in the major field and education class work, as a prerequisite to approval for Student Teaching also effective with the Class of 1977.

The College of Agriculture offers, in cooperation with the College of Education and Social Services, programs in Home Economics Education, Occupational and Extension Education and Applied Technology and Agricultural Engineering. For further information refer to sections in this bulletin describing the College of Agriculture, Department of Vocational Education and Technology, and School of Home Economics.

General Education Requirements

Each student in the College of Education & Social Services is required to select a minimum of sixty credit hours from the following five general areas, with the restriction that at least one course must be selected from each area, and taken for a letter grade. General Education courses required for certification such as English and Social Science or the University requirement of two semesters of Physical Education activities may be used to satisfy the general education requirement in that area. Students may also apply required courses in their Major and Minor, Broad Field, or Area of Concentration, to meet requirements in general education.

- | | |
|------------------------------|----------------------------------|
| I. Arts and Letters | III Social Sciences |
| a. Art | a. Anthropology |
| b. Classics | b. Economics |
| c. Communication and Theatre | c. Geography |
| d. English | d. History |
| e. Music | e. Political Science |
| | f. Psychology |
| | g. Sociology |
| II. Science and Mathematics | IV. Humanities |
| a. Biology | a. Foreign Language |
| b. Botany | b. Philosophy |
| c. Chemistry | c. Religion |
| d. Geology | |
| e. Environmental Studies | V. Health and Physical Education |
| f. Mathematics | a. Health Education |
| g. Physics | b. P.E. Methods |
| h. Statistics | c. Selected Activities |
| i. Zoology | |

Students in each teacher education program, beginning with the Class of 1974 (with the exception of those in Music Education), are required to include in their program the Personal Component (Ed. 198). The personal component offers students an opportunity to pursue an activity under self-direction. Each student is required to state the objectives for his study, to make a contractual arrangement with his personal component advisor, and to fulfill the terms of the contract. Options such as education colloquia, community action experience, seminars and discussion groups, individual counseling and group counseling, are

available—Ed. 198 is open only to UVM students enrolled in the Teacher Education Program. It is required for Freshmen and Sophomores. All others with consent of the instructor. Two credit hours are required for graduation.

Admission and Accreditation

The College of Education & Social Services has the responsibility for maintenance of standards approved by the National Council for the Accreditation of Teacher Education (NCATE). Initial admission of students is to the University of Vermont College of Education and Social Services—admission to the teacher education program occurs after special tests in communication skills and other screening measures are administered. Students must also meet personal, academic, and professional criteria established for teacher education candidates. This admission procedure is in accordance with the College's standards as approved by the National Council for the Accreditation of Teacher Education.

All teacher education candidates are expected to complete admission procedures before the beginning of the junior year in order to fulfill degree requirements. Throughout one's program the Coordination of Educational Career Planning, whose office is in 412 Waterman Building, will assist students in career planning and placement.

The programs to be described are the programs through which the UVM College of Education and Social Services achieves accreditation by the National Council for Accreditation of Teacher Education and the Vermont State Department of Education Program Approval Plan. Students completing an NCATE accredited program are qualified to receive certification in most states. Those completing a program evaluated through the Vermont State Department of Education's Program Approval Plan will have reciprocity certification in neighboring states. Further information may be obtained from the Student Personnel Services Center, 306 Waterman Building.

Art Education Kindergarten through Twelve

The program in Art Education qualifies candidates to teach art in grades K through 12. Students fulfill general education requirements and complete 42 hours in professional art education and required education courses, 48 hours in studio art, art history or related subjects, and the Personal Component (Ed. 198). Graduates satisfy College of Education and Social Services requirements for teacher certification and College of Arts and Sciences requirements for an Art Major. The program allows sufficient additional advanced courses as recommended by the Art Department for admittance to Graduate School.

Students must be enrolled in the College of Education and Social Services and application to the Art Education program must be made before the end of the sophomore year.

A typical program is as follows:

	1st SEMESTER	2nd SEMESTER		
Freshman Year			One elective from the Science and Math areas	3 or 3
*English	3	or 3	One elective from the Humanities area	3 or 3
C & T II, or 3I (8I with permission)	3	or 3	Physical Education	1 1
Foundations of Ed (Ed. 2)	3	or 3	Design (1 and 2)	3 3
Social Science	3	3	Art History (5 and 6)	3 3

*Recommended to meet specific state and national certification requirements.

1st 2nd			1st 2nd		
SEMESTER			SEMESTER		
Sophomore Year			Junior Year		
English literature elective	3	or 3	Participation (Ed. 15)	2	or 2
Psychology I	3	or 3	Curriculum & Practice in Art Ed. (Art 177)	3	—
Design (3 & 4 or equivalent)	3	3	Special Problems in Art Educ. (Art 184)	3	or 3
Studio Electives	—	—	Encounter with Art II (Art 141)	4	or 4
Related Electives	—	—	Studio Electives	—	—
Personal Component (Ed. 198)	1	1	Related Electives	—	—
Learning and Human Dev. (Ed. 145, 146)	3	3			
			1st 2nd		
			SEMESTER		
Senior Year					
†Senior Seminar (Ed. 190)			3	or 3	
Issues in Art Ed. (Art 183)			3	—	
Student Teaching (Ed. 181)			8-12 or 8-12		
Studio Seminar (Art 281)			3	—	
Studio Electives			—	—	
Related Activities					

A minimum of 124 approved semester hours is required for the degree.

Students are responsible for obtaining information regarding teacher certification and degree requirements from the appropriate College of Education and Social Services offices.

Elementary Education Kindergarten through Six

The elementary education program is designed to prepare teachers for assignments in grades Kindergarten through Six. The Bachelor of Science in Education is awarded upon satisfactory completion of our approved program. The program includes a planned sequence of professional courses and laboratory experiences. Upon completion graduates are eligible for Vermont teaching certification.

The elementary education curriculum includes a general component of sixty credits selected from the following academic areas: Arts and Letters, Science and Mathematics, Social Sciences, Humanities, and Health and Physical Education (two semesters of Physical Education activities are required). Electives may be used to build an area of concentration of twenty-four to thirty-three credits. Specific information about academic majors or general education requirements may be obtained from advisors or from the Student Personnel Services Center, 306 Waterman Building.

The professional programs begin by introducing the student to education as a field of study. The student is made aware of the social foundations and relationships of education as well as the resources available concerning the field. Emphasis is placed on the need for examining educational literature and research as part of the process of making critical judgments. Continuous field experiences are available throughout the four years. The program also includes special content courses for elementary teaching. Information concerning field experiences (deadlines, requirements, etc.) may be obtained from the Coordinator of Professional Laboratory Experience, 412 Waterman Building.

†Should accompany Student Teaching.

In addition to the academic and professional requirements, certain courses are recommended to meet specific state and national requirements in elementary education. These are specified in the typical program.

		1st	2nd			1st	2nd
Freshman Year		SEMESTER				SEMESTER	
Foundations of Ed. (Ed. 2)		3	or 3	Personal Component		1	or 1
C & T 11 or 31 (or 81 with permission)		3	or 3	General Electives and/or approved electives in Area of Concentration			
*English		3	or 3				
Intro Geography (Geog. 11)		3	or 3				
Sophomore Year		1st	2nd	Junior Year		1st	2nd
		SEMESTER				SEMESTER	
Child and Community (Ed. 3 or 4)		1	or 1	Encounter with Art I (Art 140)		3	or 3
*Music Methods (Ed.-Music III)		3		Language Arts and Children's Literature (Ed. 134)		3	or 3
*Fundamental Concepts of Elementary School Mathematics (Math 125 & 126)		3	3	Teaching Science and Social Studies (Ed. 144)		3	or 3
*American History (Hist. 23 & 24)		3	3	Language Arts and Reading (Ed. 121)		3	or 3
*English literature elective		3	or 3	*American Political Systems (Poli. Sci. 21)		3	or 3
Learning & Human Development (Ed. 145 & 146)		3	3	General Education Electives and/or approved electives in Area of Concentration			
Personal Component		1	or 1				
Senior Year		1st	2nd			1st	2nd
		SEMESTER				SEMESTER	
Teaching Mathematics and Critical Thinking (Ed. 160)		3	—				
Health and Physical Education for the elementary school (P.E. 100 and 116)		2	2				
†Senior Seminar (Ed. 190)		3	or 3				
Student Teaching (Ed. 181)		8-12	or 8-12				
General Education electives and/or approved electives in Area of Concentration							

A minimum of 127 approved semester hours is required for the degree.

Secondary Education Seven through Twelve

The secondary education program is intended to prepare teachers for junior and senior high schools in Vermont and other states. The Bachelor of Science degree is awarded upon satisfactory completion of an approved program. Upon completion graduates are eligible for Vermont teaching certification.

*Recommended to meet specific state and national certification requirements.

†Should accompany Student Teaching.

The secondary education curriculum includes a general component of a minimum of sixty credits selected from the following five academic areas: Arts and Letters, Science and Mathematics, Social Sciences, Humanities, and Health and Physical Education (two semesters of Physical Education activities are required). The student must use electives during the four years to build major and minor fields of study or a Broad Field major. Students may apply required courses in their majors and minors or Broad Field to meet requirements in general education. Specific information about academic majors or general education requirements may be obtained from advisors or from the Student Personnel Services Center, 306 Waterman Building. The program includes a planned sequence of professional courses, laboratory experiences, and the Personal Component.

Teaching Fields

All teacher education candidates must have, prior to their student teaching, at least 30 credit hours in a teaching major and 18 hours in a teaching minor or at least 48-50 hours in a Broad Field major. The following are current approved majors, minors, and Broad Field majors (detailed outlines, developed in co-operation with the respective departments, are available at the Student Personnel Services Center, 306 Waterman Building).

MAJORS Biological Science, Chemistry, Communication and Theater, Earth Science, English, French, Geography, German, History, Latin, Mathematics, Physical Science, Physics, Spanish.

MINORS Anthropology, Biology, Chemistry, Communication and Theatre, Earth Science, Economics, French, Geography, German, Health Education, History, Latin, Mathematics, Physics, Political Science, Psychology, Religion, Russian, Sociology, Spanish.

BROAD FIELD MAJORS Natural Science, Social Studies, Environmental Studies.

Students should select majors and minors which are logically related and which commonly occur as teaching combinations in secondary schools. The major-minor or Broad Field program must include credits in advanced courses.

EXPERIENCES IN PUBLIC SCHOOLS Students in secondary education usually have direct experiences in public schools throughout the four-year curriculum. Students observe and participate as teacher assistants in local junior and senior high schools. During the senior year students devote sixteen continuous weeks to full-time teaching in public secondary schools. In most cases, students must arrange to live off-campus during the student teaching assignment.

Applications for all field experiences must be made one semester in advance of assignments, and the student must assume responsibility for meeting deadlines. Information about application and assignment procedures may be obtained from the Coordinator of Professional Laboratory Experiences, 412 Waterman Building.

A typical program is as follows:

		1st	2nd		
		SEMESTER			
Freshman Year		3	or 3	One elective from the Science and Mathematics area	3 or 3
*English				One elective from the Humanities area	3 or 3
C & T 11 or 31 (81 with permission)		3	or 3	Personal Component (Ed. 198)	1 or 1
Foundations of Education (Ed. 2)		3	or 3	Physical Education	1 1
*Social Science (3 credits of U.S. History and 3 credits of Pol. Sci. 21 are recommended)		3	3	General Education electives or approved electives in major and minor or Broad Field	
		1st	2nd		
		SEMESTER			
Sophomore Year		3	or 3	Junior Year	1st 2nd SEMESTER
*English literature elective		3	or 3	Participation (Ed. 15)	2 or 2
Psychology I		3	or 3	Secondary Methods and Procedures (Ed. 178)	— 3
Learning and Human Dev. (Ed. 145, 146)		3	3	Special Subject Methods and Procedures (Ed. 179)	
Personal Component (Ed. 198)		1	or 1	(Ed-Eng 182 for English majors and Ed. 294 for C & T majors)	— 3
General Education electives or approved electives in major and minor or Broad field				General Education electives or approved electives in major and minor or Broad Field	3 or 3
		1st	2nd		
		SEMESTER			
Senior Year					
†Senior Seminar (Ed. 190)		3	or 3		
Student Teaching (Ed. 181)		8-12	or 8-12		
General Education electives in approved electives in major and minor or Broad Field					

*Recommended to meet specific state and national certification requirements.

†Should accompany Student Teaching.

A minimum of 124 approved semester hours is required for the degree.

Students are responsible for obtaining information regarding teacher certification and degree requirements from the appropriate College of Education and Social Services offices.

Music Education Kindergarten through Twelve

The curriculum in music education, leading to the degree of Bachelor of Science in Music Education, is recommended to students who have sufficient training and natural musical ability to justify a career in music. Graduates are qualified for positions as instructors and supervisors of music in the public schools.

The program includes a general component of sixty credits selected from the following five academic areas: Arts and Letters, Science and Mathematics, Social Sciences, Humanities, and Health and Physical Education (two semesters of Physical Education activities are required). Students may apply required courses in Music to meet the general education requirements. Students in the Class of 1975 have the option of electing credits in the Personal Component (Ed. 198).

The prescribed program is:

		1st	2nd			1	1
		SEMESTER					
Freshman Year				Major Ensemble			
Theory I		3	3	Foundations of Education		3	or 3
Survey of Music Lit.		3	3	(Ed. 2)			
Performance Study:				C & T 11, or 31 (81 with		3	or 3
Major, Piano, ¹ &				permission)		1	1
String Class		3	3	Physical Education		3	3
				Electives ²			
		1st	2nd			1st	2nd
		SEMESTER				SEMESTER	
Sophomore Year				Junior Year			
Theory II		3	3	Orchestration		3	—
Performance Study:				Counterpoint		3	—
Major, Piano, ¹ Voice				History of Music		3	3
& Woodwind classes		4	4	Participation (Ed. 15)		2	or 2
Ensembles: Major, Secondary				Performance Study:			
or Chamber Music ³		2	2	Major, Brass Class		3	3
Learning and Human				Ensembles: Major, Secondary			
Dev. (Ed. 145, 146)		3	3	or Chamber Music		2	2
Electives ²		6	or 6	Conducting		—	3
				Elective		—	3
		1ST	2ND				
		SEMESTER					
Senior Year							
Student Teaching in				8-12or 8-12			
Music (Ed. 181)							
Elem. & Secondary Music				5	—		
Meth.							
Performance Study: Major				1	4		
Recital, Percussion &							
Repair classes				—	2		
Ensembles: Major, Secondary				—	3		
or Chamber Music ³							
Form & Analysis				3	or 3		
Senior Seminar				—	3		
Ed. 190							
Elective							

¹Until functional piano facility achieved (See Performance, Page 255).

²To meet General Education distribution requirements.

³A second performance field may be substituted for one ensemble.

A minimum of 128 approved semester hours is required for the degree. Students are responsible for obtaining information regarding teacher certification and degree requirements from the appropriate College of Education and Social Services offices.

Social Welfare Area

SOCIAL WELFARE Provides education for social work practice based on a liberal education in the Social Sciences and Humanities. Career opportunities in the field of social welfare are explored. The student, in consultation with his Advisor, selects elective courses which will give him the opportunity to develop his individual interests. A minimum of 122 credit hours of prescribed and elective courses is required for graduation.

Physical Education
Kindergarten through Twelve

The physical education curriculum, open to men and women, includes a selection of courses from within the broad areas of General Education, General Professional Education, Specific Professional Education (including the physical education major and minor, if selected), and unstructured electives. Graduates are awarded a degree of Bachelor of Science in Education upon the completion of a 130 semester hour program.

The major program in physical education qualifies candidates to teach physical education in grades K-6, 7-12, K-12 depending upon the major option selected. Candidates may opt for a 30 credit specialty for teaching physical education in elementary schools, or a secondary school specialty. In either instance the candidate also selects an 18 credit area of concentration (minor). A third option provides for a 50 credit broad field major which prepares students for teaching in grades K-12 and includes introductory courses in Health and Recreation. There is no minor requirement with the broad field major. Candidates in all three major options will earn a minimum of eight (8) credits in activity skill courses where they will demonstrate competency in a variety of sports from intermediate to advanced levels.

Concentrations of course work in health, recreation, and athletic coaching are available to all UVM students who may elect.

All physical education majors will be required to purchase a special instructors uniform.

A typical broad field program is as follows:

Freshman Year	1st 2nd SEMESTER		Sophomore Year	1st 2nd SEMESTER	
Personal Component (Ed. 198)	1	1	Soc. Sci. Elect ²	3	3
Science Elect ³	3-4	3-4	Learning & Human Dev. (Ed. 145, 146)	3	3
Physical Ed. Activities	2	2	Anatomy & Physiology	3	3
English Elect	3	or 3	Phys. Educ. Activities	2	2
English Lit. Elect	3	or 3	Intro. to Recreation	2	—
C&T 11 or 31 (81 with permission)			Care & Prev. of Ath.	—	2
Humanities Elect ¹	3	or 3	Inj.	—	5
Foundations of Educ. (Ed. 2)	3	or 3	P.E. Teaching Exp.	3	—
Foundations of Phys. Ed	3	or 3	Coaching Elect		
Health Education	3	or 3			
Participation (Ed. 15)	2	or 2			

	SEMESTER			SEMESTER	
	1st	2nd		1st	2nd
Junior Year			Senior Year		
Kinesiology	3	or 3	P.E. for the Atypical	3	or 3
Physiology of Mus. Act.	3	or 3	Health Elective	3	or 3
Phys. Ed. in Sec. Sch.	3	or 3	Recreation Elect	3	or 3
Intramural Programs		3	Major Elect	3	or 3
Major Elect		3	Senior Seminar		
Non Major Elect	3	3	(Ed. 190)	3	or 3
PE Teaching Exp.	5	—	Student Teaching		
			(Ed. 181)	8-12 or 8-12	
			Non Major Elect	3-6 or 3-6	

¹Humanities Elect: Any course in Religion, Philosophy, or Foreign Language.

²Social Science Elect: Recommend American History and/or American Political Systems.

³Science Elect: Any combination of courses from Biology, Botany, Chemistry, Physics, Mathematics, Psychology, or Sociology.

Physical Education majors will present a minimum of 130 approved semester hours for the degree.

Students are responsible for obtaining specific information regarding degree requirements and teacher certification from the appropriate College of Education and Social Services office.

Fifth-Year Certificate in Education

A special fifth-year program culminating in a certificate of advanced study is offered for students who wish to work beyond the bachelor's degree but who need or desire more flexibility than is possible in any of the standard programs for master's degrees.

The certificate program is especially designed to meet the needs of teachers who are developing new teaching fields, for advanced students who are meeting requirements for state certification, and for experienced teachers who desire flexibility in choice of courses at both graduate and undergraduate levels.

Each certificate program is individualized to fit the qualifications and the professional objectives of the candidate. Undergraduate courses may be approved for the program when such courses appropriately support the candidate's professional objectives.

The program for the *Fifth-Year Certificate* is governed by the following regulations:

- (1) Candidates must hold a bachelor's degree.
- (2) Candidates must make written application on forms obtained from the Office of the Dean of the College of Education and Social Services.
- (3) Candidates are admitted to the program by action of a faculty committee.
- (4) A maximum of twelve credits may be applied to the program at the time of admission.
- (5) A maximum of nine credits may be transferred from other institutions.
- (6) Credits for the program may be earned in the regular academic year, the Summer Session, and the Evening Division.
- (7) The program for each candidate must include a minimum of thirty credits approved by a faculty adviser.
- (8) A minimum mark of C must be made in any course which is to be included in the program.

(9) No comprehensive examination or formal thesis is required for completion of the program, but the candidate will submit a culminating paper under the direction of his faculty adviser.

(10) The program must be completed within seven years after the time of admission.

Requests for further information about fifth-year programs should be directed to the College of Education & Social Services Student Personnel Services Center, 306 Waterman Building.

International Education Field Study

The College of Education and Social Services now offers a comparative education field experience in England and has plans to develop programs in other parts of the world.

The purpose of these programs is two-fold: 1) to provide an in-depth experience in the educational system of another country; and 2) to give the students an opportunity to live in a society different from their own.

Traveling abroad has a number of advantages. First, it broadens the outlook of the person involved in the experience whether it be social, educational, or political. Second, it affords one an opportunity to observe people in their indigenous environment. Third, it allows for an exchange of ideas and philosophies. Finally, it adds a new dimension to one's life in being able to share one's thoughts and feelings with others of a different culture.

Specifically, the field experience in England is designed primarily to offer students something more than the usual "study abroad" program. In addition to the usual visits to places of local cultural interest, this program offers an opportunity for each student to relate his professional needs, interests, goals and aspirations to a specific educational area. Students will have the opportunity to visit many areas of cultural and personal interest but, in addition, will live with a family in the host country and work as a paraprofessional in one or more of the host nation's schools.

For further information contact Coordinator, International Education Program, University of Vermont, College of Education and Social Services, Burlington, Vermont 05401.

V The College of Engineering, Mathematics and Business Administration

The College of Engineering, Mathematics and Business Administration includes the Departments of Business Administration, Civil Engineering, Electrical Engineering, Mechanical Engineering, and Mathematics and programs in Computer Science and Statistics. It offers a number of specialized professional curricula in these fields, and in physics, chemistry and geology, leading to the degree of Bachelor of Science in the field of specialization. For students whose needs are met by a less structured curriculum, the Bachelor of Science in Engineering and the undesignated Bachelor of Science degrees are offered. Details are given in the sections immediately following. In addition to the details listed in the several curricula, all students must fulfill the general requirements in physical education. Students whose curricula require them to take two years of mathematics are referred to the footnote under the offerings of the Department of Mathematics for information concerning the possible sequences of courses in freshman mathematics.

The Bachelor of Science Degree

The College of Engineering, Mathematics and Business Administration offers instruction leading to a general Bachelor of Science Degree. This degree is designed for the student who wishes to plan a degree program with a broad scientific base. Each student with his advisor will plan an integrated sequence of courses which will meet the student's objective. The plan must be approved before the student completes his first four semesters of study. Students declaring a major in Environmental Studies may substitute appropriate Environmental Studies courses with the consent of the College of Engineering, Mathematics and Business Administration Studies Committee. Other majors may be approved upon application to the College Studies Committee.

General Requirements of all Students for the B.S. Degree

Candidates for this degree must fulfill the following requirements and present a total of at least 122 semester hours of credit, including credit in required courses in physical education.

Sciences ¹	30 credits	Humanities & Social Sciences	24 credits ³
Mathematics ²	12 credits	Technical Electives	24 credits ⁴
		Free Electives	30 credits ⁴

SCIENCES

Chemistry
Engineering Sciences
Geology
Life Sciences
Physics

HUMANITIES AND SOCIAL SCIENCES

Language
Literature
Fine Arts
Philosophy
Social Sciences

TECHNICAL ELECTIVES

Business Administration
Chemistry
Engineering
Geology

Life Sciences
Mathematics
Physics
Technology Courses

The Business Administration Curriculum

The Department of Business Administration offers a program leading to a Bachelor of Science degree in Business Administration. The curriculum is designed to provide the student with a broad background in the fields of knowledge useful for managerial decision making and additionally considerable exposure to the Humanities and the Social, Physical and Mathematical Sciences. The core program required of all students provides:

- A. A background of the concepts, processes, and institutions in marketing and distribution, production, and financing functions of business enterprise.
- B. A background of the economic and legal environment of business enterprise along with consideration of the social and political influences on business.
- C. A basic understanding of the concepts and methods of accounting, quantitative methods, and information systems.
- D. A study of organization theory, interpersonal relationships, control and motivation systems, and communications.
- E. A study of administrative processes under conditions of uncertainty including integrating analysis and policy determination at the overall management level.

Beyond this core, study in a specialty option allows the student to pursue in more depth a functional area of interest to him. The areas available are Accounting, Finance, and Banking, Marketing Management and Sales Promotion, and Management.

The Department of Business Administration cooperates with the Department of Mechanical Engineering in offering courses in the Management Engineering Curriculum. This curriculum is administered by the Department of Mechanical Engineering and is described in the section on engineering curricula.

¹The distribution of courses in Sciences must be such that at least two courses must be taken from four of the five areas listed.

²The Mathematics requirement must include either Math 12 or Math 14.

³At least 6 credits of the 24 required in the Humanities and Social Sciences must be at the 100 level or above.

⁴At least 18 credits of the 54 credits required in technical and free electives must be at the 100 level or above.

The Accounting option is registered with the University of the State of New York, The State Education Department, Albany, N. Y. Students completing the requirements of the accounting option will be eligible for admission to the New York State licensing examination in Certified Public Accountancy.

A minimum of 122 approved semester hours is required for the Bachelor of Science in Business Administration degree, including required courses in physical education.

Distribution Requirements

1. Each student shall present nine semester courses (3 credits, or more, each) by choosing three courses from each of any three of the following four categories (labeled a, b, c, and d below). No courses required in the Business Administration program may be used to fulfill distribution requirements.

- a. Language and Literature

English	*Hebrew	*Russian
*French	*Italian	*Spanish
*German	*Latin	
*Greek	Literature in Translation	

*No distribution credit is allowed for courses taken in a foreign language unless at least one course in that language, at the intermediate level or above, is taken and passed.

- b. Fine Arts and Philosophy

art	music	philosophy
drama	speech	religion

- c. Social Sciences

anthropology	political science
economics	psychology
geography	sociology
history	

- d. Sciences and Mathematics

biology	physics
botany	zoology
chemistry	mathematics
engineering and technology	statistics
geology	computer sciences

2. Majors in Business Administration are required to complete a minimum of 48 hours (including the 27 hours of distribution requirements) in nonbusiness courses. Nonbusiness courses required in the business program may not be used to satisfy this requirement.

Freshman-Sophomore Core

Majors in Business Administration will normally take the following courses before enrolling in Junior-Senior core courses.

		Hours
Economics 11, 12	Principles of Economics	6
BADM 40/Math 40	Quantitative Methods in Management	4
BADM 42/Math 115	Computers in Business	3
BADM 54	Foundations of Marketing	3
BADM 60	Financial Accounting	4
BADM 61	Managerial Accounting	4
BADM 70	Human Relations in Organizations	3
BADM 144/Stat 111	Elements of Statistics	3
	Total	30

Junior-Senior Core

The following courses must be completed by all majors in Business Administration.

		Hours
BADM 151*	Principles of Marketing Management	3
BADM 173	Operations Analysis	3
BADM 180	Managerial Finance I	3
BADM 184	Financial Institutions and Markets	3
BADM 191*	Senior Seminar in Interfunctional Decision Analysis	3
	Total	15

*Accounting majors are exempt from this requirement.

Specialty Options

In addition to the courses listed above, a student must take a minimum of four courses (12 hours) in one of the areas of concentration listed below.

Finance and Banking

		Hours
BADM 185	Commercial Bank Management	3
BADM 268	Cost Accounting	3
BADM 280	Managerial Finance II	3
BADM 281	Financial Management in the Public Sector	3
BADM 282	Principles of Investments	3
BADM 283	Financial Management of International Operations	3

Marketing Management and Sales Promotion

		Hours
BADM 153	Sales and Sales Management	3
BADM 156	The Marketing Operations of Small Retail and Service Establishments	3
BADM 157	Marketing Research	3

BADM 158	Fundamentals of Advertising	3
BADM 257	Consumer Behavior	3
BADM 258	Current Marketing Developments	3
BADM 259	Marketing Management	3

Management

Management majors must take 3 of the following courses in addition to BADM 140/Stat 140.

		Hours
BADM 140/Stat 140	Introduction to Decision Making Under Uncertainty	3
BADM 268	Cost Accounting	3
BADM 271	Personnel Administration	3
BADM 274	Management Problems and Policies	3
BADM 275	Organization Theory	3
BADM/ME 175	Methods Engineering	3
BADM/ME 176	Plant Organization	4

Accounting

Accounting majors are required to take all of the following courses.

		Hours
BADM 17, 18	Business Law	6
BADM 161-162	Intermediate Accounting	6
BADM 164	Basic Federal Taxes	3
BADM 266	Advanced Accounting	3
BADM 267	Auditing	3
BADM 268	Cost Accounting	3

The Chemistry Curriculum

The Department of Chemistry offers a curriculum leading to the degree of Bachelor of Science in Chemistry. This curriculum is designed to give a sound basic training in chemistry, to prepare the student for service in some branch of the chemical profession, and to qualify him adequately for advanced study in graduate school.

A minimum of 122 approved-semester hours is required for the degree in this curriculum, including required courses in physical education. The student's program must include the following courses: Chemistry 11, 12 (or 1, 2 and 123), 131, 132, 134, 135, 141, 142, 184, 201, 202, 212, 213, at least 9 semester hours of advanced chemistry electives, which may include 197, 198; Physics 15, 16 or 24, 25; Math 13, 14, 123 (or equivalent), Math 271; proficiency in German equivalent to German 15, 16. In addition the student must take sufficient courses outside the natural sciences to satisfy the distribution requirements outlined by the College of Arts and Sciences (see pp. 96).

A typical program for those wishing to obtain the B.S. degree in Chemistry is as follows:

	1st	2nd		1st	2nd
	SEMESTER			SEMESTER	
The Freshman Year			The Sophomore Year		
General Chem. 11,12	5	5	Organic Chem. 131, 132	3	3
Electives	6	3	Organic Chem. laboratory 134, 135	2	2
Mathematics, 13, 14	4	4	Physical Chem. 142, 141		3
Physics 24		4	Mathematics 123, 271	4	3
	<hr/>	<hr/>	Physics 25		
	15	16	Electives	3	3
				<hr/>	<hr/>
				16	14
	1st	2nd		1st	2nd
	SEMESTER			SEMESTER	
The Junior Year			The Senior Year		
Adv. Inorganic Chemistry 212, 213	3	3	Advanced Chemistry		
Adv. Chemistry Laboratory 201, 202	4	4	Electives	3	3
Physical Chem. 141	3		Research 197, 198	3	3
German or elective	4	4	German or elective	3	3
Electives		6	Electives	6	3
	<hr/>	<hr/>	Seminar 184	—	1
	14	17		<hr/>	<hr/>
				15	13

Those who wish a less intensive training in chemistry may take the liberal arts curriculum with concentration in Chemistry and receive the Bachelor of Arts degree (see p. 92).

The Engineering Curricula

The engineering curricula are designed to help students learn to approach and deal in a professional manner with problems and situations they will meet as engineers, citizens and individuals. From this basic preparation they should continue to learn from experience and to grow in stature throughout their professional life.

The Departments of Engineering offer instruction in four curricula, Civil, Electrical, Manufacturing and Management, and Mechanical Engineering, each leading to the degree of Bachelor of Science in the field of specialization.

The required courses in each curriculum are normally arranged for a four-year program. These courses may be arranged in a five-year sequence if desired. Also, the course can be arranged to accommodate transfer from other curricula. One year of physical education is normally required of all students.

All junior engineering students visit Northeastern industrial centers during spring vacation. This plant inspection trip is required for graduation. The expense for the trip of several days is borne by the student.

Students enrolled in the civil, electrical, and mechanical engineering curricula may become affiliated with their respective national professional engineering societies, the American Society of Civil Engineers, the Institute of Electrical and Electronics Engineers, and the American Society of Mechanical Engineers, as each organization has authorized a student chapter at the University of Vermont. Engineering students demonstrating high scholarship attainment combined with exemplary character are recognized by membership in the Vermont Alpha Chapter of Tau Beta Pi, the national engineering honor society. These student organizations' meetings present opportunities for students to conduct activities

similar to those of the national societies. These include: technical papers presented by students and engineers actively engaged in their profession; attendance at conventions; and inspection trips. These provide helpful contacts with engineering practice and assist in the development of leadership qualities essential to success in the engineering profession.

The curricula in civil, electrical and mechanical engineering are accredited by the Engineers' Council for Professional Development.

Bachelor of Science in Engineering Degree

The College of Engineering, Mathematics and Business Administration offers instruction leading to the Bachelor of Science in Engineering Degree. This non-departmental degree is designed for those students desiring a program with a strong engineering science base in preparation for an interdisciplinary engineering specialty. Each student will be expected to declare a major before he completes the first four semesters of study. At that time the student and his advisor will plan an integrated series of courses directed towards his major. Among the possible engineering specialties are: bioengineering, computer science, power engineering, traffic engineering, environmental engineering, geological engineering, etc. Students wishing to complete the requirements for a major in Environmental Studies may substitute appropriate Environmental Studies courses with the consent of the College Studies Committee. Other majors may be approved upon application to the College of Engineering, Mathematics and Business Administration Studies Committee.

General Requirements for all Students for the B.S. in Engineering Degree

Candidates for this degree must fulfill the following requirements, which include the engineering core program and present a total of at least 124 semester hours of credit, including credit in required courses in physical education.

Engineering 1, 2	5 cr. hrs.	Humanities & Social Sciences	24 cr. hrs.
Chemistry 5	4 cr. hrs.	Engineering Sciences	18 cr. hrs.
Physics 24, 25	8 cr. hrs.	Technical Electives ¹	30 cr. hrs.
Mathematics 13, 14, 115, 123	15 cr. hrs.	Free Electives	18 cr. hrs.

ENGINEERING SCIENCES

Applied Mechanics
Electrical Sciences
Materials
Thermal Sciences
Computer Sciences

HUMANITIES AND SOCIAL SCIENCES

Language
Literature
Fine Arts
Philosophy
Social Sciences

TECHNICAL ELECTIVES

Business Administration
Chemistry
Engineering
Geology
Life Sciences
Mathematics
Physics
Technology Courses

Any substitutions in the engineering core program require the approval of the College Studies Committee.

¹A minimum of 7 courses in Technical Electives must be chosen from courses at the 100 level or above. A minimum of 18 credits of Technical Electives must be engineering courses.

THE CORE CURRICULUM FOR ENGINEERING STUDENTS

Freshman Year	1st	2nd	
	SEMESTER		
Chemistry 5	4	—	The following courses are also required
Physics 24	—	4	
Math 13 ² , 14	4	4	Physics 25
Engr. 1, 2 ³	3	2	Math 123
Math 115	—	3	Math elective
Humanities and Social Studies	3	3	4 additional courses in social sciences and humanities
	14	16	

²See footnote under course offerings of the Department of Mathematics.

³Engineering I and II are described under extra-departmental courses, pg. 221.

Civil Engineering

The curriculum in Civil Engineering, leading to the degree of Bachelor of Science in Civil Engineering, offers instruction in community planning, construction engineering, environmental engineering, hydraulics and hydrology, materials, soil mechanics, structural engineering, and transportation engineering, as well as in the engineering sciences, mathematical sciences, natural sciences, humanities, and the human and social sciences. Every candidate for this degree must earn a minimum of 122 semester hours of credit including the required courses in physical education.

Each student, with the approval of his advisor, must present a program of courses and study that satisfies the distribution requirements in the Group I, Group II, Group III and the Intern/Extern categories that follow:

A. Group I. A student must elect nine courses from this group, by choosing at least three courses from each of two of the designated areas. The three remaining courses may be taken from any area or areas in this group. In fulfilling the requirements of this Group, the student must meet the Engineering Departments' requirement of 18 hours in Humanities and Social Studies.

Group I Areas

Business Administration
Education
Languages
Literature
Fine Arts
Philosophy

Anthropology
Economics
Geography
History
Political Science
Psychology
Sociology

B. Group II. A student must elect fourteen courses from this group by choosing at least three courses from each of three of the designated areas. The five remaining courses may be taken from any area or areas in this group.

Group II Areas

1. Engineering Sciences

2. Mathematical Sciences
3. Natural Sciences—
Earth, Life, Physical

C. Group III. A student must elect fifteen courses from this group, by choosing at least three courses from each of two of the designated areas in Civil Engineering and by choosing at least two analysis courses and one design course from Structural Engineering. An additional three courses are to be selected in Civil Engineering, other engineering, or mathematics. The remaining three courses may be from any area or areas in this group, but they must contribute to his program objectives.

Group III Areas

1. Civil Engineering
Community Engineering
Construction Engineering
Environmental Engineering
Hydraulics-Hydrology
Materials Engineering
Soil Mechanics
Structural Engineering
Transportation Engineering

2. Other Engineering
3. Agriculture
4. Medicine
5. Other Professions
6. Special Areas of Support,
such as mathematics,
natural sciences, etc.

D. Intern/Extern. A student must satisfactorily complete two intern or one intern and one extern assignments. Intern assignments are individual or group investigations that are under the guidance of one or more faculty members. Extern assignments consist of practical engineering experiences in selected public and private organizations. Each student will work under the guidance of an experienced engineer or other professional person.

Electrical Engineering

The Sophomore Year	1st	2nd
	SEMESTER	
Humanistic-Social Studies	3	3
Mathematics, 123	4	—
Elem. Probability, Math. 151	—	3
Physics 25, 128	4	4
Laboratory, E.E. 81, 82	1	2
Engineering Analysis II, E.E. 3	3	—
Engineering Analysis III, E.E. 4	—	3
Engineering Computation I, E.E. 31	2	—
Engineering Computation II, E.E. 32	—	2
	17	17

		1st	2nd			1st	2nd
The Junior Year		SEMESTER		The Senior Year		SEMESTER	
Humanistic-Social Studies		3	3	Humanistic-Social Studies		3	3
Electromagnetic Field Theory, E.E. 143, 144		3	3	Approved Mathematics Elective		3	—
Thermodynamics, M.E. 115		3	—	Solid State Physical Electronics, E.E. 163		3	—
Electronics I, E.E. 121		3	—	Laboratory, 185		2	—
Laboratory, 183, 184		2	2	Energy Conversion I, E.E. 113		3	—
Signals and Systems, E.E. 171		3	—	Electronics III, E.E. 123		3	—
Solid State Physical Electronics				Information Transmission Systems, E.E. 174		—	3
E.E. 162		—	3	Laboratory, E.E. 186		—	1
Control Systems, E.E. 11		—	3	Laboratory, E.E. 188		—	1
Electronics, II, E.E. 122		—	3	Energy Conversion II, E.E. 114		—	3
II,				Energy Conversion II, E.E. 114		—	3
		17	17	Wave and Diffusion Analogies, E.E. 146		—	3
				Elective		—	3
						17	17

The above comprises what is termed the general option curriculum, for which a minimum of 134 approved semester hours is required, including required courses in physical education. Two other options are offered, with changes from the general option curriculum as follows:

(A) A pre-medical option curriculum with a minimum of 140 approved semester hours, including required courses in physical education, in which the free and Math. electives in the senior year and three courses selected with departmental approval among E.E. 174, 162, 163, 113, 114 and M.E. 115 are replaced by Chemistry 131, 132, 140 and Biology 1, 2.

(B) A computer engineering option curriculum with a minimum of 135 approved semester hours, including required courses in physical education, in which

1. Sophomore year, 2nd semester: Humanistic-Social course replaced by Math 124.
2. Junior year, 1st semester: M.E. 115 replaced by E.E. 236
3. Junior year, 2nd semester: Humanistic-Social course replaced by E.E. 237.
4. Senior year, 1st semester: Math elective replaced by Math 237 and E.E. 113 replaced by Math 218 or equivalent with departmental approval. E.E. 187 is an additional required course.
5. Senior year, 2nd semester: E.E. 114 and free elective replaced by Humanistic-Social courses and E.E. 146 replaced by Math 238.

Mechanical Engineering

	1st	2nd
The Sophomore Year ¹	SEMESTER	
Engineering Math. III, Math. 123	4	—
General Physics, 25	4	—
Manufacturing Processes, M.E. 53	3	or 3
Humanistic Social Studies Elective	3	or 3
Statics, C.E. 01	3	—
Introduction to Modern Physics, Physics 128	—	4
Dynamics, I, M.E. 133	—	3
Thermodynamics I, M.E. 92	—	3
Engineering Experimentation, M.E. 119	—	2
	14	15

¹"Elementary proficiency in use of digital computers" required in Sophomore year.

	1st	2nd		
The Junior Year	SEMESTER			
Materials I M.E. 100	3	—	Heat Transfer, M.E. 266	— 3
Thermodynamics II, M.E. 111	3	—	Fluid Mechanics, M.E. 142	— 3
Applied Math, for Engrs. and Scientists, Math. 271	3	—	Engineering Design I, M.E. 135	— 4
Electrical Engineering Principles, E.E. 101, 102	4	4	Humanistic-Social Studies ¹	3 3
				16 17
The Senior Year	1st	2nd	SEMESTER	
Materials II, M.E. 101	3	—	Engineering Design Analysis and Synthesis, M.E. 294	— 2
Systems Control, M.E. 137	2	—	The Engr. Profession M.E. 200	— 2
M.E. Elective ²	3	4	Humanistic-Social Studies ¹	3 6
Tech. Elective ³	3	—		
Thesis, M.E. 192, or M.E. Elective ²	—	3		14 17

A minimum of 127 approved semester hours is required for the degree in this curriculum, including required courses in physical education.

A student who, at the end of his junior year, has a cumulative average of 3.0 or above may become an applicant for the honors program in a special area of study. If accepted the student will determine his own program under the guidance of his adviser.

¹See distribution of Humanistic Social Studies on page 129.

²Any 200 level course with approval of the Mechanical Engineering Department.

³Technical electives from departments of engineering, mathematics or physical sciences.

Manufacturing and Management Engineering

	1st	2nd
The Sophomore Year	SEMESTER	
General Physics, Physics 25	4	—
Engrg. Math. III, Math. 123	4	—
Statics, C.E. 01	3	—
Intro. to Modern Physics, Physics 128	—	4
Applied Math. for Engrs. and Sc., Math. 271	—	3
Dynamics I, M.E. 133	—	3
Thermo. & Heat Transfer, M.E. 113	—	3
Princ. of Econ., Econ. 11, 12	3	3
Tech. & Society, Tech 51	3	—
	<hr/> 17	<hr/> 16
 The Junior Year	 SEMESTER	
Electr. Engrg. Princ., E.E. 101	4	—
Materials I, ME 100	3	—
Materials II, ME 101	—	3
Fluid Mechanics, ME 142	3	—
Materials Processing I, ME 131	—	3
Statistical Methodology, Stat. 211	—	3
Management elective ⁴	3	3
Technical electives ⁵	—	3
Humanistic-social elective	3	—
	<hr/> 16	<hr/> 15
 The Senior Year	 SEMESTER	
Safety Engineering, ME 201	2	—
Human Factors, M.E. 275	3	—
Materials Processing, II, M.E. 231	3	—
Engrg. Economy, C.E. 225	3	—
Plant Planning and Design, M.E. 276	—	4
Engineering Design I, M.E. 135	—	4
Technical elective ⁵	3	3
Free elective	—	3
	<hr/> 14	<hr/> 14

A minimum of 124 approved semester hours is required for the degree in this curriculum including required courses in physical education.

A student who, at the end of his Junior year, has a cumulative average of 3.0 or above may become an applicant for the honors program in a special area of study. If accepted the student will determine his own program under the guidance of his adviser.

⁴To be selected from Business Administration and Economics courses with approval of advisor.

⁵To be selected from departments of engineering, mathematics, business administration or physical sciences.

The Geology Curriculum

The curriculum is designed to prepare students for graduate study in geology and occupational activity at a professional level. Students are encouraged to combine geology with one or more related disciplines to develop a strong background for pre-professional training. Examples of such interdisciplinary fields include geochemistry, oceanography, geological engineering, geomathematics, environmental studies and geobiology. An advisor from the department will assist students in developing a curriculum tailored to individual needs. Students in the College of Arts and Sciences may also concentrate in geology and receive a Bachelor of Arts degree.

	1st SEMESTER		2nd SEMESTER
The Freshman Year		Mathematics 14	4
Mathematics 13	4	Chemistry 12	5
Chemistry 11	5	Liberal Arts Elective	3
Geology 1	4	Geology Elective	3
Liberal Arts Electives ³	3	Physical Education	1
	<hr/> 16		<hr/> 16

	1st SEMESTER		2nd SEMESTER
The Sophomore Year		<u>Physics 16</u>	
Geology 111	4	<u>Biology 2</u>	4
Geology 145	3	Geology Elective	3
<u>¹Physics 15</u>		Liberal Arts Elective	3
Biology 1	4	Chemistry Elective	3
Liberal Arts Elective	3	Geology 156	4
Physical Education	1		
	<hr/> 15		<hr/> 17

	1st SEMESTER		2nd SEMESTER
The Junior Year		Geology 166	3
Geology 121	3	Liberal Arts Elective	6
Geology 155	3	Ancillary Elective	3
² Ancillary Elective	3	Engineering Elective	3
Ancillary Elective	3		
Computer Science or Statistics	3		
	<hr/> 15		<hr/> 15

¹Students concentrating in geophysics must take Physics 24, 25, 128, and mathematics through differential equations, and additional courses in physics.

²Courses in science, mathematics or engineering selected so as to develop a minor area of concentration.

³Two courses in English are recommended from the twenty-four hour liberal arts requirement, English I recommended.

The Senior Year			
Geology 238	3		
Geology 197	4	Geology 198	4
Geology Elective 200	3	Geology Elective 200	3
Engineering Elective	3	Ancillary Elective ³	3
Ancillary Elective ³	3	Two Liberal Arts Electives	6
	<hr/> 16		<hr/> 16
Synopsis			
Geology courses			
Specific courses	35		
Electives	12	47	
Ancillary			
Specific courses	29		
Electives	18	47	
Engineering Electives	6	6	126 hours
Liberal Arts	24	24	
Physical Education	2	2	

³100 Level or Higher.

The Mathematics Curriculum

This curriculum is designed to provide sound basic training in mathematics, to prepare the student for a position in an area in which mathematicians are sought, and to qualify him for advanced study in graduate school. Students in the College of Arts and Sciences may also concentrate in mathematics and will receive the Bachelor of Arts degree. An adviser from the department will assist students in the determination of a program best suited to their individual needs and plans.

Two options are available in this degree program. Option A is offered to all students who want a broad program in mathematics. Option B is offered to those students who desire to specialize in the mathematics of computation. In addition, an option in statistics is available; details may be obtained from the Department of Mathematics.

Requirements for the Bachelor of Science in Mathematics degree:

OPTION A. General Mathematics

Mathematics: Math. 11, 12, 121, 124 and at least 33 additional semester hours in Mathematics and Statistics courses including at least 30 hours in courses numbered 200 or above.

Science: At least 20 hours of Science including either Physics 15, 16 or Physics 24, 25. Science courses must be chosen from the categories of physical science, biological science (including experimental psychology), agricultural science, medical science, and engineering. The student must complete at least four courses, (a minimum of 12 semester hours), in one department.

Humanities and Social Studies: Twenty-four semester hours from the elective areas listed below. These must be distributed over at least three areas, and must include at least nine semester hours in one area.

Elective Areas

1. Language
2. Literature
3. Fine Arts
4. Philosophy
5. Social Sciences

A minimum of 122 approved semester hours is required for the degree in this curriculum, including required physical education courses.

Typical Program for entering freshmen:

1st Semester		2nd Semester	
Math. 11	5	Math. 12	5
Science	3 or 4	Science	3 or 4
Humanities and Social Studies	3	Humanities and Social Studies	3
Electives	3	Electives	3
Physical Education	1	Physical Education	1

OPTION B. Mathematics of Computation

Mathematics: Math. 11, 12, 104, 115, 116, 117, 121, 124 and at least 24 additional semester hours in Mathematics and Statistics courses numbered 200 or above.

Allied Elective: At least 24 semester hours in allied fields which include physical science, biological science, agricultural science, medical science, engineering, psychology, economics and business administration. Of these at least 6 semester hours must be in an approved science and at least 12 semester hours must be in courses numbered 200 or above.

Humanities and Social Studies: (Same as in Option A)

A minimum of 122 approved semester hours is required for the degree in this curriculum, including required physical education courses.

Typical Program for entering freshmen:

1st Semester		2nd Semester	
Math. 11	5	Math. 12	5
Math. 115	3	Math. 116	3
Allied Elective	3 or 4	Allied Elective	3 or 4
Humanities and Social Studies	3	Humanities and Social Studies	3
Physical Education	1	Physical Education	1

Students entering with Advanced Placement in Calculus may take Math. 12 or 121 in the first semester.

The Statistics Curriculum

Statistics is a mathematical science which is used in a wide variety of fields. Statisticians become involved in efforts to solve real world problems by working on design of experiments, construction and interpretation of descriptive statistics, and the development and application of statistical inference procedures. Statisticians need a knowledge of mathematics and computers to develop new techniques and investigate their properties, and to carry out the necessary calculations.

The Statistics Program is a new administrative unit set up within the College of Engineering, Mathematics and Business Administration with the responsibility of offering statistics and probability courses on campus and offering degree programs for students wishing to major in these areas. The Program presently offers the M.S. Degree and plans to propose an undergraduate B.S. Degree in Statistics during the next academic year.

A student interested in majoring in statistics or probability will have a faculty member from the Statistics Program assigned as advisor. Course requirements for a statistics major will be essentially the same as those of a mathematics major

during the Freshman and Sophomore years. Accordingly, a prospective statistics major should enroll in those courses that are indicated to be appropriate for a mathematics major. During the Junior and Senior year the student will take courses in probability, mathematical statistics, and statistical methodology.

The Computer Science Curriculum

A program in Computer Science has been set up as a new administrative unit at the University. A student interested in majoring in computer science will have a faculty member from the Computer Science Program assigned as advisor. Course requirements for a computer science major will be essentially the same as those for a mathematics major during the freshman year. Accordingly, a prospective computer science major should enroll in those courses that are indicated to be appropriate for a mathematics major.

The Physics Curriculum

The Department of Physics offers a pre-professional curriculum leading to the degree of Bachelor of Science in Physics. This program is designed to give a strong background for future professional careers in industry or for graduate school. Students in the College of Arts and Sciences may also concentrate in physics and receive a Bachelor of Arts degree.

		1st	2nd			1st	2nd
The Freshman Year		SEMESTER		The Sophomore Year		SEMESTER	
Mathematics 11, 12				Mathematics 121, 124			
or 13, 14		4-5	4-5	or 123, 124		3-4	3
Chemistry 1, 2 or				Physics 25, 128		4	4
11, 12 ¹		4-5	4-5	Elective ³		3-4	3-4
Physics 24 ²		—	4	Elective ³		3	3
Elective ³		3-4	—	Elective ³		3	3
Elective ³		3	3				
		<hr/>				<hr/>	
		14-17	15-17			16-18	16-17
		1st	2nd			1st	2nd
The Junior Year		SEMESTER		The Senior Year		SEMESTER	
Physics 213, 211		3	3	Physics 273		3	
Physics Elective ⁶		3	3	Physics 197, 198 ⁴		3	3
Physics 201, 202 ⁴		3	3	Physics Elective ⁵		3	3
Mathematics Elective ⁶		3	3	Elective ³		—	3-4
Elective ³		3-4	3-4	Elective ³		3-4	3-4
				Elective ³		3	3
		<hr/>				<hr/>	
		15-16	15-16			15-16	15-17

¹Chemistry 5 may satisfy the requirement in chemistry with approval of the department.

²Physics 15, 16 is acceptable for students who wish to begin their study of physics in the first semester.

³Students majoring in physics are required to conform to the general distribution requirements in humanities and social studies of the College of Engineering, Mathematics and Business Administration, but must take at least 18 credits of electives from the areas listed on page 129.

A minimum of 122 semester hours is required for the degree in this curriculum including required courses in physical education.

HUMANITIES AND SOCIAL STUDIES

The objective of the requirements in humanities and social studies for all programs is to broaden the student's understanding of man and the relationships in human society.

Each Freshman student should, in consultation with his adviser, make a preliminary plan of an integrated sequence of courses based on his own interest. The sequence should constitute a continuing program extending through at least three undergraduate years. At the end of the first year the student will declare his elective area of concentration and, in consultation with his adviser, will prepare a plan of an integrated sequence of courses. A minimum of nine credit hours is required in the elective area of concentration.

ELECTIVE AREAS

1. Language
2. Literature
3. Fine Arts
4. Philosophy
5. Social Sciences

CREDIT FOR MILITARY STUDIES COURSES

Military Studies 1, 2, and 12 are approved in the category of humanistic social studies for all programs in the College. The College Studies Committee acts on petitions for credit for any other courses.

CREDIT FOR MILITARY SERVICE

The College of Engineering, Mathematics and Business Administration does not, in general, grant credit for Military Service. Credit for specific courses or other academic experience acquired during Military Service may be available through petition to the Studies Committee.

English 1, *Written Expression*, is recommended for students needing or wanting to improve their writing skill.

⁴With departmental permission, a student may replace Physics 201, 202 or 197, 198 with laboratory experience in industrial employment, or Physics 220 and 222 with laboratory, or with junior-senior level laboratory course offerings of other departments. Any difference in academic credits may be included among electives.

In the senior year, Physics 201, 202 may be repeated in place of Physics 197, 198.

⁵Physics electives in the junior-senior years must include 214, 265 and 254. Other science courses may be substituted with departmental approval.

⁶The undergraduate major is required to take at least two advanced courses in mathematics beyond the sophomore year. In addition the student is required to become competent in computer programming.

V The Division of Health Sciences

The Division of Health Sciences, authorized by the Board of Trustees, became effective July 1, 1968, bringing together several related programs in this important field. It includes the College of Medicine, the School of Allied Health Sciences, and the School of Nursing.

The Division reserves the right to require the withdrawal of any student from any curricula whose health, academic record or performance and behavior in the professional careers is judged unsatisfactory.

The College of Medicine Requirements for Admission

Applicants to The University of Vermont College of Medicine are expected to complete the required courses of study by July 1 preceding the September admission date—in a college or university accredited by the National Committee of Regional Accrediting Agencies of the United States.

Required are one year each of the following college level courses:

- Biology
- Physics (including laboratory)
- General or inorganic chemistry
- Organic chemistry

In addition, because a physician requires a broad and balanced cultural background as well as a technical education, the College recommends as appropriate to an adequate premedical program:

English—at least one and preferably two years of composition and or literature.

Mathematics—dependent upon secondary school preparation but should include at least an introduction to calculus.

Behavioral Sciences—one or two years in the areas of psychology, sociology or anthropology.

The Humanities—at least two years of course work in history, philosophy, religion or the arts.

The College of Medicine encourages its prospective students to concentrate while in college in a field of knowledge of their choice, whether in the sciences or humanities, and to pursue these interests in depth. It seeks students with diverse collegiate and extra-collegiate backgrounds, but insists that their pattern of performance has demonstrated intellectual drive, independent thinking, curiosity and discipline.

Eligibility of an applicant for admissions is determined by the Admissions Committee of the College of Medicine on the basis of the following:

- 'The scholastic record of the applicant in his premedical work.

- Maturity, readiness, non-academic aptitude and motivation for the study and practice of medicine as determined by information from the applicant's undergraduate faculty and by personal interview with the Admissions Committee.

- The applicant's scores on the Medical College Admission Test. Applicants are urged to take the Test in May preceding application.

The Committee strives to select as students those applicants who will benefit most from the College's specific educational program. Within the selection process, the needs of society are considered in addition to those of the individual applicant.

Applicants who present competitive credentials and are residents of Vermont, Massachusetts, Maine and Rhode Island are given preferential consideration. Sons and daughters of alumni of the College of Medicine are given special consideration.

The final closure date for receiving applications is November 1 preceding the September admission.

An application fee of \$15.00 (not refundable) is payable on request of the Office of Admissions.

The Curriculum

The curriculum consists of three parts: the basic science core, the clinical core, and the senior major program.

Basic Science Core

The forty-eight weeks of instruction in the Basic Science Core spans the freshman year and fall semester of the sophomore year. During this period students are instructed in the basic sciences that undergird clinical medicine. Emphasis is placed on that body of knowledge common to all types of medical practice, avoiding the minute details relevant only to individual specialties. Seminars in Behavioral Science and the Basic Clerkship provide for the first year medical student clinical contacts, an awareness of social, cultural and psychologic factors affecting health and illness, and insight into the major issues influencing the practice of medicine.

Clinical Science Core

The Clinical Core extends from January of the sophomore year until December of the junior year. During this twelve-month period each student receives twelve weeks of instruction in medicine, twelve weeks of instruction in surgery, eight weeks in pediatrics, eight weeks in obstetrics and gynecology, and eight weeks in psychiatry. There will be a brief summer vacation. During this year the students work under the supervision of a physician within the wards and clinics of the Medical Center Hospital in providing primary care to patients.

Senior Major Program

The final portion of the curriculum, the Senior Major Program, extends through the final one and one-half years prior to graduation. This period is divided into sixteen rotations of one month duration. The major program enables each student to select that course of study best suited to his career objectives. Majors are offered in each of the preclinical sciences plus medicine, family practice, surgery and its subspecialties, obstetrics—gynecology, pediatrics, neurology, psychiatry, and rehabilitation medicine.

An integral part of each clinical major includes a number of required clinical and laboratory experiences as well as elective rotations. These elective rotations are not restricted to the disciplines in which the student is majoring and may include approved learning experiences away from Burlington. Many students see this as an opportunity to work and study in a large urban setting, at another medical school or a foreign medical center. Students should anticipate spending variable periods of time away from Burlington in the course of pursuing their required training. A system of faculty advisers has been developed to counsel each student on a one-to-one basis throughout the planning and course of this major program and in anticipation of later graduate education. Although the majority of students elect to pursue a clinical major, students so desiring may commit their entire major program to study in one of the preclinical sciences. While these programs are individualized, it is expected that graduate study and research will form the basis for each. Qualified students may simultaneously enroll in the Graduate College of the University as candidates for the Master of Science degree while fulfilling the requirements for the M.D. degree within the College of Medicine.

The School of Allied Health Sciences

The School of Allied Health Sciences offers a variety of programs in response to the social and health care needs of our community. It encourages interaction among its students and faculty for closer participation in meeting this need. All programs offer clinical education experiences in a variety of appropriately approved hospitals and health facilities in Vermont and the eastern part of the country. The academic programs are accredited by the responsible professional agencies.

The Program in Dental Hygiene

The Department of Dental Hygiene offers a two-year curriculum leading to an Associate in Science degree and a Certificate in Dental Hygiene.

The program is accredited by the Council on Dental Education of the American Dental Association. Graduates are eligible to write the National Board Ex-

amination in Dental Hygiene and meet requirements for licensure determined by individual states.

The duties of a graduate dental hygienist are educational and preventive in nature and may be carried out in private dental practice, public institutions, hospitals and industrial clinics, and public health programs. Dental hygienists practice under the supervision of a dentist. The primary concentration of her skills is in oral health education, oral prophylaxis and inspection. However, she is qualified to perform procedures for the prevention of dental caries, expose and process dental radiographs, and assist in other phases of dental practice. The dental hygienist is a vital member of the health science professions, and her opportunities are practically unlimited.

Requirements for admission to study in the Dental Hygiene Program are identical with general University requirements, with the additional requirement that applicants write the Dental Hygiene Aptitude Test. Information and application forms for this test are available from the American Dental Hygienists' Association, 211 East Chicago Ave., Chicago, Ill. 60611. Applicants are encouraged to have a personal interview, preferably after their application is completed.

As this program of study is scientifically oriented, high school courses in algebra, chemistry, biology and physics are important prerequisites. Personal attributes essential to success in this program include good health, emotional stability, task orientation, high moral standards and an ability to relate well with society.

The courses of study are designed to give the student a well rounded foundation in basic sciences, specific knowledge in dental sciences and an understanding of the humanities. Clinical experience is obtained in the department's dental hygiene clinic where patients of all ages and with varieties of problems receive service, and in community oral health care situations. Dental hygiene students also have an opportunity to increase their communication skills through oral health education presentations in schools in the area.

Students applying for this program should be interested in and have aptitude for scientific studies.

The Freshman Year	1st SEMESTER	2nd SEMESTER	The Sophomore Year	1st SEMESTER	2nd SEMESTER
English	3	—	Microbiology 55	4	—
Anatomy 9	3	—	Clinical Dental		
Physiology 10	—	3	Hygiene 81-82	4	4
Chemistry 3	4	—	Myofunctional		
Oral Tissues 11-12	3	3	Therapy 71	1	—
Dental Hygiene 1-2	2	3	Public Speaking		
Physical Education	1	*1	Speech II	3	—
Psychology 1	—	3	Oral Pathology 53-54	2	2
Nutrition H 140	—	3	Periodontology 55	3	—
Radiology 61	—	2	Pharmacology and		
	16	18	Anesthesiology 52	—	1
			Anthropology 21	—	3
			Dental Materials 91	—	1
			Dental Practice 62	—	3
			Elective	—	3
				17	17

*A minimum of 66 approved semester hours plus two semesters of physical education and a grade point average of 2.0 is required for the Associate Degree in this curriculum. A grade course of "C" or better is required for all professional courses.

The Program in Medical Technology

The Department of Medical Technology offers an integrated Associate Degree Medical Laboratory Technician (MLT) and a Baccalaureate Degree Medical Technology (MT) curriculum. After completion of the Associate Degree program, the graduate may be eligible for certification by the Board of Registry of the American Society of Clinical Pathologists as MLT (ASCP) and shall have obtained an employable skill. Those students accepted into the final two years of the program leading to the Baccalaureate Degree will be provided the option of greater education and experience in depth and breadth in the entire field of Medical Technology, or if the student so desires, specialization in one of the disciplines within Medical Technology.

The minimum requirements for the first two years are as follows:

	Credit Hours	
	1st	2nd
	SEMESTER	
English	3	—
Mathematics*	3-5	—
Chemistry 3	4	—
Anatomy 9	3	—
Laboratory Science 11	—	3
Medical Technology 3	1	—
Elective	(3)	(3)(6)
Biochemistry 102	—	4
Physiology 10	—	3
	<hr/> 17-19	<hr/> 13(16)

*Achievement Tests are required for all students planning course work at the collegiate level. The purpose of requiring these achievement tests is for placement only.

The Second Year:

	1st	2nd
	SEMESTER	
Microbiology 55	4	—
Chemistry 16	4	—
M.T. 20,21,22,23*	(10)(8)	(8)(10)
Electives		6
Dynamics of Health Care		2
	<hr/> 18(16)	<hr/> 18(16)

*Each course offered each semester. Students will be assigned to these courses on a rotating basis.

A minimum of 62 approved semester hours including university requirements for physical education and a grade point average of 2.0 is required for the Associate Degree in this curriculum.

Due to limitations imposed by physical facilities, the number of students admitted to the final two years of the Baccalaureate Degree program will be limited. Students desiring to be admitted to the final two years should make application to the Department of Medical Technology in the spring of the second year. The deadline date for application will be announced early in the second semester. It

will be necessary for each applicant to show evidence of technical proficiency, good academic achievement, and adherence to high standards of professionalism. A Selection Committee will review each applicant and make recommendations to the Chairman of the Department. Personal interviews may be requested. The Department Chairman will make the final decision and notify the applicants by April 1.

All students accepted for the additional two years leading to the Baccalaureate Degree, regardless of their specialty area, will enroll in the following:

Biochemistry 211-212	8
Physics 11-12, (15-16)	8
Pathology 101	3
Allied Health 199	3
Instrumentation Laboratory 204	4
Electives	
	<hr/> 21

The remainder of the curriculum is designed to provide advance instruction in theory and practice within the specialty area.

A minimum of 128 approved semester hours and a grade point average of 2.0 are required for the Bachelor of Science Degree.

The Program in Physical Therapy

The Department of Physical Therapy offers a four-year curriculum leading to a Bachelor of Science degree. In the freshman and sophomore years, students will concentrate on the necessary prerequisite courses. These prerequisites are in the humanities, sciences, and social sciences. In the sophomore year, the student will begin the basic sciences of anatomy and physiology and introductory courses in Physical Therapy. The junior and senior years are devoted to the professional program with time to further explore the humanities and social sciences required for a liberal education. During the professional program, clinical education experiences will provide the student with concurrent opportunities to apply the acquired knowledge and skills. The program of study is:

	1st	2nd		1st	2nd
The Freshman Year	SEMESTER		The Sophomore Year	SEMESTER	
*English	3	—	Physics 11, 12	4	4
C & T	—	3	*Electives	7	2
Chemistry 3, 16	4	4	Anatomy 101	5	—
Biology 1, 2	4	4	Physiology 100	—	5
*Mathematics	3	—	Physical Therapy 21, 22	2	2
Psychology 1	—	3	Physical Therapy 111	—	—
Elective	—	3	Kinesiology	—	3
Physical Education 1, 2	1	1	Physical Therapy 173	—	2
	15	18	Inquiry I	—	2
				18	18

*Courses dependent on Freshman Placement

*(Optional/Advisor)

		1st	2nd			1st	2nd
The Junior Year		SEMESTER		The Senior Year		SEMESTER	
Anatomy 102		3	—	Physical Therapy			
Physiology 101		5	—	151-152		5	3
Pathology 101		3	—	Psychology (PT 161)		2	—
Physical Therapy				Physical Therapy			
121-122		3	5	133-134		2	2
Physical Therapy				Electives		7	—
131-132		1	2	Physical Therapy 158		—	5
Physical Therapy 144		—	3	Clinical Education II			
*Electives		3	6	Physical Therapy 172		—	3
*Physical Therapy 142		—	2	Physical Therapy 174		2	—
		—	—	Physical Therapy 176		—	2
		18	18			18	15

*(Optional/Advisor)

PT 128 Clinical Education I—6 week period, full-time; May-June or later/3 Cr.

PT 158 Clinical Education II—10 weeks full-time; Jan. thru. Mar.

Second Semester Senior Year

A minimum grade point average of 2.0 is required for the Baccalaureate Degree in this curriculum.

The full-time Clinical Education Program (PT 128, PT 158) is an integral part of the curriculum offering the student opportunities to apply academic knowledge in the clinical setting. The program is widely affiliated throughout the North Eastern United States. Students affiliating will be responsible for the cost of transportation and living expenses (including room and board) during the 6 week periods of the Junior summer and the 10 week period of the Senior Spring semester. Students should plan their finances to include these expenses.

The affiliations will be scheduled as indicated unless inconvenient for the clinical facilities. Students may be required to affiliate during an alternate time period if sufficient clinical facilities are not available.

The Programs in Radiologic Technology

The Department of Radiologic Technology offers three programs designed to provide academic and clinical instruction leading to the Associate in Science Degree. Graduates are eligible to write the examinations of the American Registry of Radiologic Technologists in one of three specialty areas; radiography (x-ray), nuclear medicine technology, or radiation therapy technology. Students acquire clinical experience at the Medical Center Hospital of Vermont and other affiliated hospitals in the northeast.

Interested persons should write directly to the Department office in the Rowell Building for detailed information.

	1st	2nd
FIRST YEAR	SEMESTER	
(all students)		
College Algebra (Math 9)	3	
English (English 1)	3	
Introductory Physics (Physics 3)	4	
Human Anatomy (Anatomy 9)	3	
Physical Education	1	1
Clinical Orientation (RT 1, 2)	3	3
Human Physiology (PSL 10)		3
Medical Terminology (MEDT 3)		1
Introductory Radiologic Science (RT 12)		3
*Elective		3
	17	14
SUMMER		
(all students)		
Thirteen week internship at an affiliated hospital		
SECOND YEAR		
(Radiography Program)		
Radiographic Science (RT 31)	3	
Radiographic Techniques (RT 33, 34)	3	3
Clinical Practicum (RT 71, 72)	3	3
*Electives	6	6
Radiopathology (RT 14)		3
Dynamics of Health Care (AH 2)		2
	15	17
(Nuclear Medicine Technology Program)		
Introductory Chemistry (CHEM 3)	4	
Nuclear Medicine Technology (RT 41, 42, 44)	6	3
Clinical Practicum (RT 71, 72)	3	1
*Electives	3	6
Dynamics of Health Care (AH 2)		2
	16	15
(Radiation Therapy Technology Program)		
Radiation Therapy Technology (RT 51, 52)	3	3
Clinical Practicum (RT 71, 72)	3	3
*Electives	9	3
Dynamics of Health Care (AH 2)		2
Radiopathology (RT 14)		3
Clinical Oncology (RT 54)		3
	15	17
SUMMER		
(all programs)		
Thirteen week internship at affiliated hospitals		
*ELECTIVES (at least one three-credit course from three of the four categories)		
A. English, communication, Romance Languages		
B. Anthropology, Home Economics (Human Development), Philosophy, Psychology, Religion, Sociology		

- C. Economics, Environmental Studies, Forestry, Geology, Military Science, Political Science, Resource Economics
- D. Art, Languages (Chinese, Greek, Latin, German, Hebrew, Japanese, Russian), Music, Theater

A minimum of 62 credits is required for graduation. In addition, students must achieve a minimum grade-point-average of 2.0 for all radiologic technology courses.

The School of Nursing

The School of Nursing offers two distinct educational programs to prepare qualified individuals for the practice of nursing. The Professional Nursing program is four years in length and leads to the Bachelor of Science degree. The Technical Nursing program is two years in length and leads to the Associate in Science degree. Both programs are approved by the Vermont State Board of Nursing and accredited by the National League for Nursing, Inc.

Transfer between the two programs is possible in accord with University policy and with consent of the department concerned. Effective with students entering in the fall of 1973, a minimum 2.0 quality point average is required for graduation.

Professional Nursing Program

The Department of Professional Nursing offers a curriculum leading to the Bachelor of Science degree. This curriculum is designed to provide the opportunity for qualified individuals to prepare for professional practice in beginning positions in various settings, to acquire a foundation for continued formal study in nursing, and to enhance growth toward maturity as individuals, professional persons, and citizens. The graduates of this program are eligible for licensure as registered nurses, and may advance without further formal education to positions which require beginning administrative skills.

The curriculum, conducted in four academic years, provides an approximate balance in general and professional education. Courses in the sciences—biological, physical and social—serve as a foundation for the professional nursing courses.

A typical program of studies follows:

		1st	2nd			1st	2nd
		SEMESTER				SEMESTER	
The Freshman Year		3	3	The Sophomore Year			
English				Human Development,			
General Psychology,				H.Ec. 80-81		4	4
Psy. I		—	3	Introductory Microbiology,			
Outline of Chemistry,				MCBI 55		4	—
Chem. 3-4		4	4	Mammalian Anatomy and			
Sociology		3	—	Physiology, Zool. 5-6		3	3
Public Speaking, C.&T. 11		3	—	Nursing 102		—	3
Electives		3	6	Nursing 104		—	3
Physical Education		1	1	Nutrition & Health,			
				H.Ec. 141		—	3
		17	17	Electives		6	
						17	16

	1st	2nd		1st	2nd
The Junior Year	SEMESTER		The Senior Year	SEMESTER	
Nursing 125	9	—	Nursing 145	9	—
Nursing 126	—	9	Nursing 146	—	9
Electives	6	6	Nursing 151	3	—
	—	—	Nursing 152	—	6
	15	15	Elective	3	—
				—	—
				15	15

In addition to the general educational courses found in the curriculum outlined above, specific courses in general education are required and additional courses are elected in accordance with individual need and interest and in consultation with the faculty adviser. These are:

Social Sciences—15 credits

Including Psychology 1 and Sociology 10, 101, 165 or acceptable substitute

Humanities and Languages—15 credits

Including English—6 credits

Philosophy 3 credits

Including Communication and Theater 11—3 credits

General Electives—15 credits

Students are encouraged to study a foreign language, mathematics, or other discipline of their choice.

A minimum of 127 approved semester hours is required for the Bachelor of Science degree.

Technical Nursing Program

The Department of Technical Nursing offers a curriculum leading to the Associate in Science Degree. The curriculum is designed to prepare qualified individuals to give direct nursing care to patients of all age groups and to promote development of the individual as a responsible member of society. The graduates of this program are eligible for licensure as registered nurses and are prepared for nursing practice in hospitals, clinics, nursing homes and other health agencies.

The curriculum is two academic years and one four-week summer session in length. General education courses account for approximately one-half of the total required credits and nursing courses for the remaining one-half. Nursing courses are taught concurrently with general education courses throughout the two years and include classroom instruction and guided clinical experiences in selected agencies.

A typical program of studies follows:

	1st	2nd		3	—
The Freshman Year	SEMESTER		Anatomy, Anat. 9	—	3
English Elective	3	—	Physiology, PSL 10	—	3
General Psychology, Psy. 1	3	—	Clinical Nutrition, H.Ec. 41	—	3
Principles of Sociology,			Fundamentals of Nursing,		
Soc. 10	—	3	Nursing 11-12	5	5
Approved Elective*	—	3		—	—
				15	17

	1st	2nd	Nursing Care of Children and Adults, Nursing 27-28		
The Sophomore Year	SEMESTER				
Electives	3	3		10	10
Dynamics of Health Care, AH2	2	—			
Nursing Seminar, Nursing 30	—	2		15	15

Physical Education—2 credits during the 2 years
 Summer Session—4 weeks Nursing Care
 of Children and Adults, Nursing 14—4 credits

*English History
 Philosophy Religion

A minimum of 67 approved semester hours is required for the degree.

Advanced Standing

The School of Nursing provides an opportunity for individuals who have had prior experience in the health field to receive advanced standing in the program to which admission is sought. Admission to the program is essentially the same as for other applicants to the University. In accord with University policy, the student may apply for credit by examination in general education and selected nursing courses.

Individuals planning to seek admission with advanced standing are urged to write to the School of Nursing for more detailed information and to arrange for a personal interview prior to applying for admission or taking courses for college credit at this or another institution.

General Information

Applicants must satisfy the general admission requirements for the University. High School courses in biology, chemistry, and physics are highly recommended.

Grades in nursing courses are based on achievement in theory and in laboratory practice, both of which must be satisfactory to receive a passing grade. The School of Nursing reserves the right to require the withdrawal from nursing of any student whose health, academic record, or performance and behavior in nursing is judged unsatisfactory.

All students in the School of Nursing are responsible for transportation to and from the agencies which are used for clinical experiences. These include the Medical Center Hospital of Vermont; the Burlington Visiting Nurses' Association, Inc.; the Vermont State Hospital, Waterbury; and other selected agencies.

Financial aid is available in the form of scholarships, loans, prizes and employment (see section on Financial Aid). Of special interest to students in nursing is the Nursing Student Loan Program. Anyone interested should make application for financial aid by February 1.

In addition to funds handled through the University, students in the baccalaureate program may apply for appointments in the Army Student Nurse Program or the Navy Nurse Corps Candidate Program at the beginning of their junior year. The appointments carry generous financial allowances. A student who participates twelve months or less serves on active duty in the respective service for twenty-four months. If two years of financial support have been received, thirty-six months of service are required.

Continuing Education

In cooperation with the professional association, voluntary and official agencies, and health care institutions or agencies, continuing education programs are arranged to meet the needs of registered nurses.

Professional Personnel in Cooperating Agencies

Mrs. Elizabeth Davis, B.S., R.N., Executive Director, Burlington Visiting Nurse Association, and Clinical Assistant Professor

Mrs. Tobah Gladstone, M.S., R.N., Psychiatric Nurse Clinician, Medical Center Hospital of Vermont, and Clinical Assistant Professor.

Mrs. Vera Hanks, R.N., Chief, Patient Care Services, Vermont State Hospital

Patricia Kelly, M.S., R.N., Director of Nursing, Medical Center Hospital of Vermont, and Clinical Associate Professor

Kathryn Lambert, M.S., R.N., Associate Director of Nursing, Medical Center Hospital of Vermont, and Clinical Assistant Professor

Mrs. Lois Sabin, B.S., R.N., Director for Educational Programs, Vermont State Hospital, and Clinical Instructor

V The School of Home Economics

The School of Home Economics concerns itself with man's physical, social, and psychological relationship to his environment and offers five programs, each leading to a bachelor of science degree. Concentrations within programs offer a variety of backgrounds for professional careers. All programs require 120 semester hours of course work including:

General requirements	
Behavioral and social sciences	6 credits
Communications skills	6 credits
Humanities	6 credits
Physical and biological sciences	6 credits
Home Economics	
Integrated courses	12 credits
Physical Education	
Physical education activities	2 credits
Professional concentration requirements and electives	82 credits

Programs of Study

Clothing, Textiles, and Design

CONCENTRATIONS: Clothing, Textile Design, and Textiles.

Prepares students for careers in merchandising, consumer research and counseling, fashion and textile designing, and promotional work in industry and the Extension Service. Professional requirements include courses in Clothing, Textiles and Design, Humanities, Social Sciences and Chemistry.

Early Childhood and Human Development

CONCENTRATIONS: Early Childhood Development, Human Development, and Human Development Education (offered jointly with the Home Economics Education Program).

The concentration in Early Childhood Development provides the student with academic and work experiences focusing on the developmental needs of young children. It is closely aligned with the concentration in human development and cooperates with Elementary Education. Students prepare to work in public and private meetings for young children and their families. Students are encouraged to participate in community programs. A year of study at the Merrill-Palmer Institute in Detroit, Michigan, may be arranged.

In human development the approach is interdisciplinary and ontogenetic, close ties being maintained with other programs in the school and other departments in the University. A year of resident study at the Merrill-Palmer Institute in Detroit, Michigan, may be arranged. The student may prepare for work in agencies dealing with children and families, the public schools, and graduate studies.

The concentration in Human Development Education is designed to provide the student with a broad background, the necessary experience in professional education, and a full complement of preparation in the disciplines of home economics that focus on the developing individual. Students completing this concentration will be eligible for certification to teach home economics with particular competencies in the areas of human development, child care, and family living and sex education.

Home Economics Education

CONCENTRATIONS: Consumer and Homemaking Education or Middle School Living Arts, Extension Education, and Human Development Education (offered jointly with the Early Childhood and Human Development Program as described above).

Prepares for a variety of teaching opportunities including high school Consumer and Homemaking programs, the newly developing areas of middle and elementary education in Living Arts, Adult Teaching, Occupational Home Economics, and positions in the Extension Service. All students who plan to specialize in any phase of education must make application to Teacher Education and must have a 2.5 average in their home economics subjects to be eligible for student teaching during their senior year. (See Teacher Education at UVM.)

Housing, Consumer Economics and Home Management

CONCENTRATIONS: Housing, and Consumer Economics and Home Management.

Careers include work with utility companies or appliance dealers and a wide variety of opportunities in planning and management of housing and interiors. Students may prepare to work as consultants for urban renewal relocation, city planning, architectural and building firms. Promotional work may be found with consumer education and research, newspapers and magazines, radio and TV. Emphasis may be directed toward one of the following professional goals: Housing and Equipment, Housing and External Environment, Housing and Interior Design, Family Economics or Home Management. Professional requirements may be chosen from the Humanities, Social Sciences and Physical Sciences.

Human Nutrition and Foods

CONCENTRATIONS: Dietetics, Foods, Hospitality Industry, Human Nutrition, and Nutrition Education.

Students may develop a strong background for professional careers, graduate study or college teaching by selecting a concentration in dietetics, foods, hospitality, human nutrition, or nutrition education. The concentration in dietetics is designed to meet academic requirements for membership in the American Dietetic Association.

V The School of Natural Resources

Programs of study in the School of Natural Resources are aimed at providing a philosophical and scientific basis for professional work in the use and management of natural resources, with particular reference to the areas of forestry, wildlife ecology, recreation resource management, and natural resource economics. The School is a newly organized unit on the campus and its full program is currently in a planning stage. In addition to already established areas noted above, planning is now underway for new programs of study in water resources, land use planning, and environmental engineering.

The four-year undergraduate program leads to the Bachelor of Science degree and qualifies the graduate for employment in a variety of positions with federal and state agencies, various resource-using industries, resource associations and consulting firms, and other employers of natural resource specialists.

DEPARTMENT OF FORESTRY The curriculum in the Department of Forestry provides a liberal education in the humanities and sciences and a professional education in forestry. The professional core emphasizes the science and technique of coordinating the management of forest and wildland for forest products, water, wildlife, and recreation. The program is designed to prepare individuals for positions in forestry or for graduate study in the forest sciences.

A minimum of 138 semester credit hours of prescribed and elective courses is required for graduation.

Forestry

The Freshman Year	1st SEMESTER	2nd
Fundamentals of Calculus (Math 25)	3 ¹	—
Engineering Graphics (ME 1)	—	2
General Zoology (Zool. 9)	4	—
Intro. to Plant Biology (Bot. 4)	—	4
Introduction to Forestry (For. 1)	2	—
Freshman Seminar (For. 2)	—	1
English	3 ⁶	—
Physical Education	1	1
Outline of Gen. Chemistry (Chem 3)	—	4
Other Courses	3-4 2,5,6	4-5 2,5,6

See next page for footnotes.

The Sophomore Year

Elements of Statistics (Stat. 111)	3	—
Plane Surveying (C.E. 12)	4	—
Dendrology (For. 5)	4	—
Silvics (For. 122)	—	3
Forest Biometry I (For. 144)	—	3
Introductory Physics (Physics 3)	—	4
Other Courses	5-6 ^{2,5,6}	6-7 ^{5,6}

Summer Field Program

Forest Biometry II (For. 140)	4
Forest Bioecology (For. 100)	4

	1st SEMESTER	2nd
The Junior Year		
Silviculture (For. 123)	3	—
Forest Regeneration (For. 124)	—	3
Forestry Economics (For. 151)	3	—
Wood Technology (For. 162)	—	3
Other Courses	10-11 ^{3,4,5,6}	10-11 ^{3,4,5,6}
The Senior Year		
Timber Harvesting (For. 163)	3	—
For. Policy and Admin. (For. 153)	3	—
Forest Management (For. 136)	—	3
Other Courses	10-11 ^{4,5,6}	13-14 ^{4,5,6}

¹Students not qualified to enter Math 25 will take Math 5 during the first semester followed by Math 25 during the second semester.

²Geology 1 (Introductory Geology) must be taken before the second semester of the sophomore year.

³Two courses in forest protection (For. 107, For. 112 or For. 132) must be taken during the junior year.

⁴Two courses in multiple use forestry (For. 135 and WLB 174) must be taken during the junior and senior years.

⁵All students must complete the following requirements in the Arts, Social Sciences and Humanities.

- Macro-Economics (Econ. 12) before For. 151
- One course in Political Science
- One course in either Psychology or Sociology
- One elective course from either Art, Classics, History, Music, Philosophy or Religion.

⁶All students must complete the following requirements in English and Communications.

- One course in English Literature and Communications
- Public Speaking (C & T 11)
- Technical Reporting (Votec 273)
- One communications elective course from an approved list.

WILDLIFE BIOLOGY This program prepares individuals for professional careers requiring expertise in wildlife biology and ecology. All majors must complete a core of courses which meets the minimum recommendations of The Wildlife Society for professional training, and which satisfies education requirements of the U.S. Civil Service Commission as well as most state agencies for entrance grades in wildlife positions. Program flexibility allows each student, in consultation with an advisor, to expand the core with coursework appropriate to personal education and career goals.

Course sequences can be developed for rather traditional positions in WILDLIFE MANAGEMENT, to prepare for graduate study in WILDLIFE SCIENCE, or to prepare for developing positions in WILDLIFE RESOURCES (communications, conservation management and director posts, secondary or vocational education, information-education or interpretive naturalist, planning and programming, and outdoor recreation, for example). Completion of 133 semester hours of credit in core and elective courses is required for the Bachelor of Science Degree.

Wildlife Biology Core Curriculum

	1st SEMESTER	2nd
The Freshman Year		
Intro Zoology (ZOOL 9)	4	—
Intro Plant Biology (BOT 4)	—	4
Pre-Calculus (MATH 5) ¹	3	—
Chemistry Requirement ²	4	—
Physics Requirement ²	—	4
Communication Requirement ³	3	3
Amer Pol Systems (PSCI 21)	—	3
Physical Education	1	1
Electives ^{4,6}	3	3
The Sophomore Year	1st SEMESTER	2nd
Syst & Phylogeny (BOT 109) or Dendrology (FOR 5)	3-4	—
Gen Ecology (BOT 160) or Silvics (FOR 122)	—	3
Game Mammals (WLB 175)	4	—
Avian Biology (ASCI 158)	—	4
Statistics (STAT 111 or 211)	3	—
Communication Requirement ³	—	3
Electives ^{4,6}	6-8	6-8
The Junior Year	1st SEMESTER	2nd
Gen Structure & Function (BIOL 103)	4	—
Comp Structure & Function (ZOOL 104)	—	4
Prin of Wildlife Management (WLB 174)	—	3
Earth Science Requirement ⁵	3-4	—
Electives ^{4,6}	9-11	9-11

See next page for footnotes.

SCHOOL OF NATURAL RESOURCES

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	1st SEMESTER	2nd
The Senior Year		
Wetlands Wildlife Ecology (WLB 271)	4	—
Upland Wildlife Ecology (WLB 272)	—	4
Wildlife Diseases (ANPA 110)	—	3
Economics (RSEC.61 or 121 or FOR 151)	3	—
Wildlife Seminar	1	1
Electives ^{4,6}	8-10	8-10

Wildlife Summer Camp

Wildlife Field Biology & Ecology (WLB 100)

or Wildlife Biometrics (WLB 170) 3-4

Total Program Requirements, Semester Hours

133

¹Qualified students should substitute higher Calculus (MATH 25).²One lab course in each Chemistry and Physics, or two in Chemistry (selected from CHEM 1, 2, 3, 4, 16, 131; PHYSICS 3, 11, 15).³One course must be taken in each subdivision: (a) English Composition (ENGL 1, 50, or 53); (b) Speech (C&T 11); (c) Visual Methods (ART 2, 3, 161, or 162; or EDUC 142; or HEC 173; or VOTC 156).⁴Social Sciences: in addition to Economics and American Political Systems, three more hours must be taken in either Anthropology, Psychology, or Sociology. Humanities: courses must be taken in three of the five subdivisions (a) Art, Music, Theatre; (b) History (including history courses in other humanities); (c) Literature (including foreign language literature courses); (d) Philosophy; (e) Religion.⁵One course selected from the following (CE 163; GEOL 1, 25, 60; P&SS 61, 261).⁶Eighteen hours in Professional/Technical subjects selected with consent of program advisor.

RECREATION MANAGEMENT All majors in Recreation Management are required to successfully complete a series of core courses during the freshman and sophomore years. Upon completion of the sophomore year the student may elect to concentrate in one of two areas: Public Outdoor Recreation or Private Outdoor Recreation and Tourism.

These concentrations are designed to prepare students for professional careers in the management of outdoor recreation resources. The public recreation resources include parks, campgrounds, and recreation areas at the local, regional, state, and federal governmental levels. Private resources include ski areas, campgrounds, hunting preserves, and other specialized recreation areas.

Two Year Core

	1st SEMESTER	2nd
The Freshman Year		
English Elective	3	3
Math 2 ¹ and 9 ¹	3	3
Botany-Biology Elective	3(4)	—
Freshman Recreation Seminar, RM 8	—	2
Sociology-Psychology Elective	3	3
Electives	3	4

The Sophomore Year

Speech Elective	3	—
Soils-Geology Elective	—	3(4)
Political Science Elective	—	3
Economics Elective	3	3
Plant Identification Elective ²	(4)3(2)	—
Surveying, CE 12	4	—
Graphics-Cartography Elective ¹	—	3(2)
Electives	3	6

Recreation Management Summer Camp

Courses	Credits
Recreation Management 150	3

PUBLIC OUTDOOR RECREATION The Recreation Management Program's concentration in public land management prepares the student for a professional career in the management of wild lands for outdoor recreation use. It combines course work from the various natural resource disciplines with social sciences, communications, and public administration and management.

	1st SEMESTER	2nd SEMESTER
The Junior Year		
Forest Recreation Planning, RM 135	3	—
Economics of Outdoor Recreation, RM 225	—	3
Recreation Business Management, RM 151	3	—
Silviculture, For. 123 or Urban Forestry, For. 126	—	3
Resource Economics, RSEC 121	3	—
Elementary Statistics, Stat. 111	—	3
Advanced Sociology-Psychology Elective	3	3
Electives	3	3

The Senior Year

Senior Recreation Seminar, RM 182	—	2
Recreation Operations, RM 153	3	—
Park Interpretation, RM 156	3	—
Participation in Recreation Management, RM 159	—	3
Landscape Design Elective	—	3
Public Policy Elective	—	3
Soil, Water, or Wildlife Management Elective	3	—
Recreation Buildings and Electricity Elective	3	—
Electives	3	4

Total Program Requirements, Semester Hours

124

PRIVATE OUTDOOR RECREATION AND TOURISM This program is designed to prepare students for professional management careers in a variety of private outdoor recreation enterprises and tourist-oriented business firms. Special emphasis is given to the management

¹May be waived if student has adequate high school preparation.

²Student must select a course in Dendrology, Tree and Shrub Identification, or Ornamental Horticulture.

problems of private ski areas (special courses, seminars, internship programs, etc.) but the program is sufficiently flexible to permit specialization in several types of private recreation management. Course work is concentrated in the areas of business and natural resource management.

	1st SEMESTER	2nd
The Junior Year		
Economics of Outdoor Recreation, RM 225	—	3
Recreation Business Management, RM 151	3	—
Forest Recreation Planning, RM 135	3	—
Principles of Marketing, BA 121	3	—
Advanced Sociology-Psychology Elective	3	3
Elementary Statistics, Stat 111	—	3
Business Administration Elective	3	3
Electives ³	—	3
The Senior Year		
Senior Recreation Seminar, RM 182	—	2
Recreation Operations, RM 153	3	—
Ski Area Management, RM 157	3	—
Participation in Recreation Management, RM 159	3	—
Landscape Design Elective	—	3
Business Law, BA 9	—	3
Silviculture, For, 123, or Urban Forestry, For.	—	3
Soil and Water Management Elective	3	—
Electives ³	3	4

Total Program Requirements, Semester Hours

124

RESOURCE ECONOMICS This program deals with the application of economic theory to natural resource allocation problems. It prepares an individual to use the logic of economics and the perception of conservation to recommend the efficient and equitable use of natural resources. Graduates will be prepared for positions in natural resource management, planning, and administration.

Resource Economics Core Curriculum

	1st SEMESTER	2nd
The Freshman Year		
Fine Arts or Humanities	3	3
English, Speech, Drama, or Writing	3	3
Intro to Economic Geography (GEOG 14)	3	—
Social Sciences	—	3
Fundamentals of Calculus I (MATH 25)	3	—
Fundamentals of Calculus II (MATH 26)	—	3
Physical Education I, 2	1	1
Electives	3	3

³Free electives can be utilized to educate students in particular interest areas of private recreation management.

	1st SEMESTER	2nd
The Sophomore Year		
Principles of Economics (ECON 11)	3	—
Principles of Economics (ECON 12)	—	3
Social Sciences	3	—
Statistics	—	3
Natural Science Elective	3	3
Electives	6	6
The Junior Year	1st SEMESTER	2nd
Resource Economics (RSEC 121)	3	—
Natural Resource Evaluation (RSEC 222)	—	3
Spatial Analysis (GEOG 243)	—	3
Microeconomic Theory (ECON 186)	3	—
Macroeconomic Theory (ECON 190)	—	3
Electives	9	6
The Senior Year	1st SEMESTER	2nd
Economics of Outdoor Recreation (RM 225)	3	—
Forest Economics (FOR 151)	3	—
Legal Aspects of Planning (RSEC 235)	—	3
Regional Economic Growth (ECON 217)	—	3
Introduction to Econometrics (ECON 267)	—	3
Electives	9	6
Total Program Requirements, Semester Hours		122

ENVIRONMENTAL STUDIES Students interested in Environmental Studies may enroll in the School of Natural Resources (see page 144). They may have a coordinate major or major in Environmental Studies.

V The Environmental Program

The Environmental Program is an interdisciplinary effort to strengthen the educational, research, and service missions of the University related to the study of man and his environment. Students and faculty from each of the University's colleges and schools combine their diverse skills and experience in a variety of academic and action-oriented programs, on campus and in the community, which enrich the understanding of cultural and biophysical environments essential to the quality of life.

A Director and small staff, assisted by an Executive Committee of students and faculty, direct the activities of the Environmental Program. Faculty members from a broad range of academic departments serve in the Environmental Studies Advising Group as advisers to undergraduates. Program offices are located in The Bittersweet where students are invited to visit with the staff regarding their interests and future plans. The Environmental Resource Center is also located in The Bittersweet to assist faculty and students with research and action projects, and to provide current information on regional and state environmental activities.

The Environmental Studies Curriculum

The curriculum in Environmental Studies offers students a wide variety of alternatives, including an individually-designed interdisciplinary *Major in Environmental Studies* and several options which combine study in a traditional major with a *Coordinate Major in Environmental Studies*.

Students entering the University as freshmen may apply for admission to Environmental Studies through several of the University's undergraduate colleges and schools. Choice of the appropriate college or school will depend on the individual's interests and educational objectives. Those seeking a liberal arts program will normally register in the College of Arts and Sciences. Those interested in the applied sciences or education will usually register in the College of Agriculture; College of Engineering, Mathematics, and Business Administration; The School of Natural Resources; School of Home Economics or the College of Education and Social Services. Choice of the appropriate college should be made only after careful study of the Catalogue and, if possible, consultation with the Director of the Environmental Program or his staff.

Degree Requirements

Students must complete the distribution requirements and minimum credit-hour requirements of their College or school of registration, and the following core course sequence:

Required Core Courses	Credit Hours
Environmental Studies 1	3
Environmental Studies 2 (selected elective)	3
Environmental Studies 100	3
Environmental Studies 204	3
Total	12

Incoming Environmental Studies students will be assigned an adviser by the Environmental Program. Not later than the sophomore year, in consultation with this adviser, the student will select one of the following Major programs:

COORDINATE MAJOR IN ENVIRONMENTAL STUDIES For the majority of students, this program offers the best combination of career opportunities and personal interests. In addition to completing the Required Core Courses listed above, a student must complete the degree requirements for a departmental major in his or her college or school of registration *plus one of the following coordinate options*:

1. Major Specialization Option. At least 3 advanced, environmentally-focused courses in the major field, or a closely-related field. These courses may, if appropriate, satisfy both departmental and Environmental Studies major requirements.

2. Minor Specialization Option. At least 3 advanced courses in a second major field, constituting an environmentally-focused minor.

3. Supporting Program Option. At least 4 advanced courses with environmental emphases which support the major program, and usually in at least two fields outside the major department.

4. Environmental Education Option. This option is for students in the College of Education and Social Services seeking certification in Environmental Studies in elementary or secondary education. See page 107 of the Catalogue.

MAJOR IN ENVIRONMENTAL STUDIES For selected students whose needs and interests cannot be met by the major programs currently offered by the undergraduate colleges, the Major in Environmental Studies provides the option of an individually-designed, interdisciplinary major program. Admission to the Major in Environmental Studies requires approval of the student's Environmental Studies adviser and successful completion of the Major Seminar (E.S. 51).

Required Courses	Credit Hours
Core Courses (E.S. 1, 2, 100, 204)	12
Environmental Studies 51	3
Individually-designed program*	24+
Environmental Studies 201	3
Environmental Studies 202-203	TBA**
Total	42+

*Selection of courses and planning of the individually-designed program will usually be accomplished as a course project in the Major Seminar (E.S. 51).

**TBA—Credit to be arranged. An independent thesis project planned and approved in E.S. 201. Usually a minimum of 6 credits.

The Living/Learning Center

The Living/Learning Center, which opened in September 1973, is a complex of six interconnected buildings which brings together suites for students, apartments for faculty and visiting scholars, instructional space, recreational rooms, a dining area, a snack bar, and common lounges and meeting rooms. The Living/Learning Center is a University-wide facility including students from all classes and educational programs from every academic division. The Center seeks to promote programs that explore educational directions and methodology, provide opportunities for enrichment for traditional studies, and encourage students to assume increased responsibility for their own education. By thorough evaluation of all programs the Center seeks to "learn about learning" and apply the information in allocating instructional resources in the Center and across the campus as a whole.

Programs are generally developed in two ways, (1) by members of the faculty who develop designs in their areas of expertise, and (2) by groups of students who are given the opportunity to compete for space in the Living/Learning Center by designing their own programs. All academic credit toward degrees is granted by the Divisions, Colleges or Schools of the University, *not* by the Living/Learning Center.

Students live in the Center by virtue of their participation in a program. This fall the faculty designed programs include studies in nutrition, education, art, living literature, German, Russian, Chinese, Japanese, organic chemistry, medieval-renaissance studies, cross-cultural communications and others. The student designed programs among others include Spanish, "Adopt-a-Stream," community action groups, and behavior modification. Along with the wide range of faculty and students who come to the Center and use its facilities and participate in its activities every day, there will be ten faculty and their families, resident advisors, and resident assistants living in the Center. Within the Center academic life and scholarly inquiry co-exist with daily living patterns.

For information about the student designed programs contact the Office of the Director, Living/Learning Center.

V The Graduate College

The purpose of the Graduate College is to serve the needs of the college graduate who desires a broader and more thorough knowledge of scholarship and research in his chosen field. The College offers the following programs leading to the Master's degree and to the degree of Doctor of Philosophy. Each student is expected to be familiar with the general regulations and procedures of the Graduate College, and with the specific degree requirements in his chosen field of study. *For detailed information refer to the Graduate College Bulletin available from the Graduate College Office, 335 Waterman Building.*

Master of Arts

Programs are offered in the following fields:

Communication
English
French
Geography

German
Greek & Latin
History

Political Science
Psychology
Spanish

Master of Science

Programs are offered in the following fields:

Agricultural Economics
Anatomy
Animal Sciences
Animal Pathology
Biochemistry
Biomedical Engineering
Biostatistics
Botany
Chemistry
Civil Engineering
Computer Science

Economics of Natural
Resource Planning
Electrical Biophysics
Electrical Engineering
Forestry
Geology
Home Economics
Mathematics
Mechanical Engineering
Medical Microbiology

Medical Technology
Microbiology
Pathology
Pharmacology
Physics
Physiology and Biophysics
Plant and Soil Science
Speech Pathology
Statistics
Zoology

Master of Arts in Teaching

This degree is appropriate for teachers who are interested primarily in increasing their knowledge of their subject matter fields and thereby the effectiveness of their classroom instruction. Programs are offered in the following fields:

Agriculture
Botany
Chemistry
English
French
Geography

Geology
German
Greek & Latin
History
Industrial Education

Mathematics
Music
Physics
Spanish
Zoology

Master of Science for Teachers

This degree is designed primarily for secondary school teachers who wish to strengthen their backgrounds in their subject matter field, and who desire flexibility in choosing courses at levels best suited to their needs. Programs are planned on an individual basis.

Mathematics
Biology (Botany & Zoology)
Physical Sciences (Chemistry & Physics)

Master of Education

The master of education degree is intended to give those who work in education the kind of background and professional preparation needed for leadership in teaching and functions related to it. Programs are planned on an individual basis with special attention to such fields as:

Administration	Reading and Language	Special Education
Foundations of Education	(Elementary and Secondary)	Student Personnel Services in
Occupational and Practical	School Counseling	Higher Education
Arts Education	(Elementary and Secondary)	Teacher Education

Master of Business Administration

Study leading to the degree of Master of Business Administration is designed to provide an opportunity for the individual to develop knowledge and understanding in a wide range of business activities that will provide foundation for growth and success in a business career. Programs are planned on an individual basis.

Master of Extension Education

This degree is designed to provide opportunity for those who work in non-school educational and counseling programs to develop knowledge and understanding in activities related to program management and educational methodology.

Programs are planned on an individual basis with special attention to fields such as:

Agriculture	Family Centered Services
Youth Organizations	Business and Industry

Doctor of Philosophy

Programs are offered in the following fields:

Anatomy	Electrical Engineering	Physics
Animal Sciences	Mechanical Engineering	Physiology and Biophysics
Biochemistry	Microbiology	Plant and Soil Science
Botany	Pharmacology	Psychology
Chemistry		Zoology

Fifth Year Certificate in Education

A special fifth year program culminating in a certificate of advanced study is offered by the Department of Education for students who wish to work beyond the bachelor's degree. It is especially designed to meet the needs of teachers who are developing new teaching fields, for advanced students who are meeting requirements for state certification, and for experienced teachers who desire flexibility in choice of courses at both graduate and undergraduate levels. Information about the certificate program may be obtained by contacting the Dean of the College of Education and Social Services.

Concurrent Degrees

Post-sophomore fellows in medicine are permitted to use credit from appropriate medical courses toward an M.S. or a Ph.D. They are enrolled in the Graduate College for one or more years to pursue research and enroll in such courses as would normally not be included within a medical program. Such persons, therefore, are working toward an M.D. and M.S. or Ph.D., but completion of each degree may occur at a different time.

All courses for which graduate credit is received at UVM in a master's degree program, whether a master's degree is received or not, may be applied toward a Ph.D. at UVM provided they are appropriate for the Ph.D. program.

No provision is made for a person to employ the same credit to satisfy two master's degrees at the University of Vermont.

V Continuing Education

Through Continuing Education the University provides opportunities for formal and informal study to persons who have not attended college, who require additional training in their work, or who wish to pursue previously unexplored areas of study.

The Summer Session

Summer Session offers courses in many subjects at both the graduate and undergraduate level.

The offerings are diversified to meet the needs of those who desire courses leading to a bachelor's degree; those who wish to do graduate work; principals and superintendents of schools who desire fundamental or specialized courses in the fields of educational administration and supervision; teachers in elementary or secondary schools who seek credit toward state teachers' certificates, or who desire to broaden their knowledge of special subjects; persons who desire college level courses for self-improvement.

It is recommended that any regularly matriculated student at the University of Vermont can obtain prior approval from his academic dean for any courses to be taken in the Summer Session. The purpose of this recommendation is to insure such courses are appropriate for the degree for which the student is working.

The master's degree in several, but not all, areas may be earned through work in the Summer Session. All students desiring graduate credit for courses taken in the Summer Session must secure the approval of the Dean of the Graduate College at the time of registration. Enrollment in courses for graduate credit does not imply admission to the Graduate College. Details about available courses and programs will be sent on request by the Director of Continuing Education.

Evening Division

The University's Evening Division program provides educational opportunities for adults. Members of the faculty at the University, and others working under temporary appointment, offer evening or extension courses in many disciplines both at the Burlington Campus and at locations throughout Vermont. Many courses may be taken for credit but some are non-credit courses designed for the adult who is interested in continuing his education for pleasure or self-improvement.

Courses are given in towns and cities throughout the state wherever a group of ten or more individuals register for a course.

Arrangements for Evening Division courses are made through the Evening Division, Grasse Mount. Length of courses varies from ten to fifteen weeks.

It is recommended that any regularly matriculated student at the University of Vermont obtain prior approval from his academic dean for any courses to be taken in the Evening Division. The purpose of this recommendation is to insure such courses are appropriate for the degree for which the student is working. All persons desiring graduate credit must secure the approval of the Dean of the Graduate College at the time of registration.

Non-Degree Student Enrollment

Non-degree students are persons who have presented minimum credentials and are permitted to undertake limited course work in the day program for purposes other than that of earning a degree. Credits earned by non-degree students who later apply and gain admission to a degree program will be evaluated and, if appropriate, will be accepted toward completion of their degree. Non-degree students may enroll for a maximum of 6 credits (or two courses) per semester; additional courses may be enrolled for only with permission from the appropriate Academic Dean. Undergraduate non-degree students may not exceed a total accumulation of 30 semester credit hours without special permission from the Dean of the college involved. Graduate students are limited to a total accumulation of 9 semester hours.

Undergraduate Non-degree Students, those seeking only undergraduate credit for course work taken, apply for approval to the Division of Continuing Education which will act as their college office.

Graduate Non-degree Students, those seeking graduate credit, must register through the Graduate College.

Selection of courses for those having long range plans of earning a degree should be made on the basis of information given in this catalog. Students interested in making a formal application for admission to the University should contact the office of Admissions, Clement House.

All non-degree students who would like assistance in planning educational programs and selecting courses should contact the Division of Continuing Education at Grasse Mount. (telephone 656-2085)

Conferences and Institutes

Conference activity is a rapidly increasing part of University life. Both throughout the regular college year and during the summer, many conference groups make use not only of University classroom and auditorium facilities but also of University dormitories and dining service. Groups interested in arranging for meetings or conferences at the University should contact the Conferences and Institutes Office, Grasse Mount. This office also coordinates the Speakers Bureau through which University personnel are made available to organizations outside the campus.

University Church Street Center

The Center, opened in May, 1974, is a market place where businessmen, politicians, teachers, students, craftsmen, doctors, lawyers, and others from all backgrounds who may confront one another and learn from each other. The University offers a variety of non-credit activities ranging from mini-courses to exhibits in the Center. Activities are developed around community interest and needs. The Center also serves as an informational source for all University programs and activities.

V Courses of Instruction

The University reserves the right to change these course offerings at any time.

The departments and areas of instruction are arranged alphabetically, and the college in which each is located is indicated.

A student who lacks the stated prerequisites for a course, but is otherwise qualified to take it, may be permitted to enroll by the department.

Courses numbered from 1 through 99 are elementary and intermediate courses.

Those numbered from 100 through 199 are advanced undergraduate courses. They usually have at least one year of prior work in that discipline as a prerequisite. They may be taken as minor courses, but in some departments only a limited number may be taken as major courses. They are not ordinarily available for graduate credit.

Courses numbered from 200 through 299 are relatively more advanced courses for undergraduates which may also be taken for graduate credit by graduate students. They usually require at least two years of prior work in that and related disciplines. To obtain graduate credit the graduate student generally is expected to meet higher qualitative or quantitative expectations than the undergraduate student.

Two numbers with a comma between (17, 18) indicate that the separate semester courses may be taken independently for credit.

Two hyphenated numbers (17-18) indicate that the semester courses may not be taken independently for credit and, unless otherwise stated, they must be taken in the sequence indicated.

The number of credit hours *per semester* is stated in each course description.

Odd-numbered courses are generally offered the first semester; even-numbered courses are generally offered the second semester; variations from this arrangement may be indicated by the Roman numeral I for the first semester or II for the second semester.

The form (2-3) immediately following the course title indicates the number of class hours respectively of lecture and of laboratory.

Allied Health

DIVISION OF HEALTH SCIENCES

2 DYNAMICS OF HEALTH CARE Introduction to the whole pattern of comprehensive health care; a core course for students in the health career programs. Two hours. Nursing and Allied Health staff.

199 ALLIED HEALTH This course is designed to introduce procedures and methods of instruction in various teaching situations. Enrollees have the opportunity to design and participate in a teaching activity. Concurrent offering is an introduction to the basic principles in management, supervision, and administration. Project emphasis on investigation of concepts for projecting new patterns to meet the needs of future health care systems. Two lectures per week, four projects. Three hours. Staff.

Anatomy

COLLEGE OF MEDICINE

Professor Young (Chairman); Associate Professors Freedman and Wells; Assistant Professors Boushey, Horst, Krupp, McCandless and Paull; Instructor Finn.

9 INTRODUCTORY HUMAN ANATOMY 2-3 Designed principally for students in the Allied Health professions, this course focuses upon topographic human anatomy. By use of prosections, radiographs, microscopic slides and other illustrative materials, the student studies the major regional relationships in the human body, as well as the appropriate microscopic correlations in organ systems. Department permission. 3 hours. Staff.

101 GROSS ANATOMY FOR PHYSICAL THERAPISTS (3-6). This course is designed to place emphasis upon the structural and functional aspects of the human musculoskeletal, peripheral nervous, cardiovascular and respiratory systems. Lectures will correlate clinical applications of functional anatomy where appropriate. Detailed regional dissections, radiographs, prosections, skeletal materials and other materials will be utilized in the laboratory. Departmental permission. 5 hours. Staff.

102 NEUROANATOMY—HISTOLOGY FOR PHYSICAL THERAPISTS (2-3). With primary emphasis upon the structural basis of central nervous system function, this course will also examine the functional micromorphology of other organ systems (esp., musculoskeletal, cardiovascular, respiratory and integumentary). This course is designed to supplement Anatomy 101. Lectures will focus upon the principles of functional organization, with clinical examples where appropriate while the laboratory will utilize microscope slides, movies and gross preparations of the central nervous system. Prerequisites: Anatomy 101. Departmental permission. 3 hours. Staff.

Animal Pathology

COLLEGE OF AGRICULTURE

Professors Bolton (Chairman) and Joseph Gans; Associate Professors Murray and Henry Doremus; Adjunct Associate Professor Wadsworth.

105 ANIMAL ANATOMY Gross and microscopic structure of the organ systems of the mammalian body with emphasis on farm animals. Three hours. Dr. Murray.

106 ANIMAL DISEASES Fundamentals of disease recognition and prevention in domestic animals. Special disease problems in cattle and horses with emphasis on control measures. *Prerequisite:* 105 recommended. Three hours. Dr. Murray.

107-108 LABORATORY ANIMAL TECHNIQUES (3-2) Laboratory procedures used in the examination of blood, fecal, urine, milk, and tissue specimens. Preparation of tissue sections. *Prerequisite:* departmental permission. Four hours. Dr. Joseph Gans.

110 WILDLIFE DISEASES Common diseases and parasitic problems of large game animals, small fur-bearing animals, waterfowl and game birds. Autopsy techniques and diagnostic laboratory procedures. *Prerequisite:* 2 courses in biology or zoology. Three hours. Dr. Bolton. Alternate years, 1974-75.

197, 198 SENIOR RESEARCH Work on a research problem under the direction of a qualified staff member. Findings submitted in written form as prescribed by the department. *Prerequisite:* senior standing. Three hours. Staff.

217-218 LABORATORY ANIMALS (2-2) Life cycles, nutrition, housing, breeding, disease prevention, colony management, preoperative and postoperative care, and humane methods of handling. *Prerequisite:* departmental permission. Three hours. Dr. Henry Doremus.

220 LABORATORY ASSIGNMENTS Rotating assignments in the Animal Pathology Laboratory and Division of Animal Services under the guidance of the professional staff. *Prerequisite:* departmental permission. Three hours. Staff.

Animal Sciences

COLLEGE OF AGRICULTURE

Professors Atherton, Balch, Duthie, Smith (Chairman), and Welch; Associate Professors Carew, Foss, Nilson, and Simmons; Assistant Professor Rutledge; Adjunct Associate Professors Mercia, and Woelfel, and Adjunct Assistant Professors Gibson and Leamy

2 INTRODUCTORY ANIMAL SCIENCE Fundamental principles of anatomy, physiology, nutrition, breeding and management of animal species important in our agricultural economy. Three hours. Mr. Smith and staff.

33 INTRODUCTORY DAIRY TECHNOLOGY (2-2) Basic information on milk and milk products and application of this information in laboratory exercises. Three hours. Mr. Duthie.

43 **FUNDAMENTALS OF NUTRITION** A comprehensive study of specific nutrients in terms of their availability, function, utilization, and requirements in mammalian species. Three hours. Mr. Carew.

44 **DAIRY CATTLE SELECTION (2-3)** Fundamental principles of dairy cattle selection and breeding. Three hours. Mr. Gibson. Alternate years, 1974-75.

104 **FOOD TESTING AND QUALITY CONTROL (2-2)** Composition and properties of basic food materials. Standard methods of bacteriological and chemical analysis and their significance in product quality. Three hours. Mr. Atherton.

✓109 **FOOD MICROBIOLOGY (2-3)** Desirable and undesirable activities of microorganisms in foods. Laboratory methods in quality control. Microbial contamination, food spoilage, and food-borne disease. Three hours. Mr. Atherton.

114 **MANUFACTURED DAIRY PRODUCTS (2-3)** Methods and technical problems in manufacturing milk products such as cheese, butter, evaporated and dry milks. *Prerequisites:* 33, junior standing. Three hours. Mr. Nilson. Alternate years, 1975-76.

✓121 **SENSORY EVALUATION OF FOODS (1-4)** Taste and odor as basic components of flavor, sensory tests for consumer acceptance studies and practical training in flavor identification. Three hours. Mr. Duthie. Alternate years, 1974-75.

153 **MILK PROCESSING (2-2)** Technical aspects of processing fluid milk and fluid milk products. *Prerequisite:* departmental permission. Three hours. Mr. Nilson. Alternate years, 1974-75.

158 **INTRODUCTION AVIAN BIOLOGY (3-3)** Designed for students with general interests in biology. Topics-Evolution, comparative structure and function, behavior, migration and orientation, flight, identification, population regulation. Four hours. Mr. Foss.

160 **ANIMAL BREEDING (2-3)** Theory and application of genetic principles of breeding of livestock. *Prerequisite:* 2. Three hours. Mr. Rutledge. Alternate years, 1974-75.

170 **GENERAL PHYSIOLOGY** An intermediate course, especially designed for the biology student to increase his knowledge of animal functions at the organ system level in mammals. *Prerequisite:* Animal Pathology 105 or equivalent. Three hours. Messrs. Foss and Simmons.

177 **ADVANCED LIVESTOCK PRODUCTION (2-3)** Organization and operation of livestock enterprises. Theory and application of feeding, breeding and management programs and principles. *Prerequisite:* junior standing. Three hours. Mr. Welch. Alternate years, 1975-76.

187, 188 **LIGHT HORSE PRODUCTION AND MANAGEMENT (2-3)** The problem of light horse production. Application of the principles of selection, management and horsemanship. *Prerequisite:* 187 for 188; junior standing. Three hours. Mr. Balch.

190 **POULTRY SCIENCE** Scientific principles employed in poultry enterprises including evolution, genetics, breeding, incubation, hatching, brooding and rearing, nutrition, pathology, housing, and marketing. *Prerequisite:* junior standing. Three hours. Mr. Carew. Alternate years, 1975-76.

197, 198 **UNDERGRADUATE RESEARCH** Research activity under the direction of a qualified staff member. Findings submitted in written form as prescribed by the

department. *Prerequisites:* junior standing and department permission. Three hours. Staff.

211 ICE CREAM AND FROZEN DAIRY PRODUCTS (2-3) Fundamentals of ice cream manufacturing, the physico-chemical and biological factors involved; calculation of formulas; sherbets and specialties; merchandising; sanitary control. *Prerequisites:* 104; credit or concurrent enrollment in 109; junior standing. Three hours. Mr. Nilson. Alternate years, 1975-76.

246 ADVANCED NUTRITION (See home economics 246) Three hours. Mr. Tyzbir.

249 NUTRITION SEMINAR (See home economics 249) Three hours. Mr. Tyzbir and Mr. Carew.

251 ADVANCED DAIRY CATTLE MANAGEMENT (2-3) Organization and operation of dairy enterprises. Theories and methods of application of feeding, breeding, and management programs and principles. *Prerequisite:* 43. Three hours. Mr. Woelfel. Alternate years, 1975-76.

256 DAIRY PLANT MANAGEMENT (2-3) Organization and operation of milk processing and manufactured milk products plants. *Prerequisites:* 153, Ag. Ec. 62; junior standing. Three hours. Mr. Nilson. Alternate years, 1974-75.

271 ENDOCRINOLOGY (2-2) Anatomy, physiology, glandular interrelationships, and assay methods of the endocrine glands and their hormones. *Prerequisite:* departmental permission. Three hours. Mr. Simmons.

275 PHYSIOLOGY OF REPRODUCTION AND LACTATION (2-2) Fundamental principles of the physiology of reproduction and lactation with the primary emphasis on farm animals. Three hours. Mr. Simmons. Alternate years, 1974-75.

281, 282 ANIMAL AND DAIRY SCIENCE SEMINAR Reports and discussions of problems and special investigations in selected fields. One-three hours. Maximum credit two hours senior, three hours graduate. Staff.

291 SPECIAL PROBLEMS IN ANIMAL AND DAIRY SCIENCE Reading, discussion, and special laboratory investigation in the field of animal and dairy science. *Prerequisite:* departmental permission. A student may enroll more than once for a maximum of six hours. Staff.

294 HISTORY OF NUTRITION (See home economics 294) One hour. Staff.

Anthropology

COLLEGE OF ARTS AND SCIENCES

Associate Professors Haviland (Chairman), Mitchell, Woolfson; Assistant Professors Magnarella, C. Pastner, S. Pastner; Instructor Honerkamp.

Anthropology

21 THE CULTURES OF MAN The culture concept; the lifeways of non-Western societies of varying social complexity. Three hours. Staff.

24 **INTRODUCTION TO PREHISTORIC ARCHAEOLOGY** The origins and antiquity of culture; the nature of archaeological data and interpretation. Three hours. Ms. Honerkamp.

26 **PHYSICAL ANTHROPOLOGY** An introduction to the study of the evolution and racial differentiation of man. Three hours. Mr. Haviland.

50 **LANGUAGE IN CULTURE** This course is designed to provide background in linguistic anthropology. Three hours. Mr. Woolfson.

51 **FIELD METHODS IN LINGUISTICS** Training in the Anthropological methods of obtaining linguistic data. Each student will work with an informant whose native language is other than English. At the end of the semester, each student will present a phonemic inventory of the pertinent sounds in the language he or she has explored. *Prerequisite:* 50 or Linguistics 101. Mr. Woolfson.

131 **PRIMITIVE RELIGION** (See Religion 131).

160 **NORTH AMERICAN INDIANS** An ethnographic survey of the major native American cultures of Mesoamerica and the United States against the background of aboriginal culture history, and problems arising from contact with European cultures. *Prerequisite:* 21. Three hours. Mr. Haviland.

161 **CULTURES OF SOUTH AMERICA** An ethnographic survey of the major native American cultures south of Mesoamerica against the background of aboriginal culture history, and their relation to the present day culture spheres of Euro-America, Indo-America and Plantation America. *Prerequisite:* 21. Three hours. Mr. Haviland.

162 **CULTURES OF AFRICA** An ethnographic survey of representative native societies of sub-Saharan Africa and of major colonial/immigrant minorities. Emphasis is placed on changes occurring as results of colonialism, independence and modernization. *Prerequisite:* 21. Three hours. Staff.

165 **PEOPLES OF SOUTH ASIA** The culture and social organization of the peoples of Pakistan, India, Bangladesh and Sri-Lanka. Theoretical issues in the anthropological analysis of these societies will be discussed. *Prerequisite:* 21. Three hours. Mr. Pastner.

166 **PEOPLES OF THE MIDDLE EAST** A cultural survey of the peoples living in the lands from Egypt to Afghanistan with emphasis on the Arabs, Turks and Persians. *Prerequisite:* 21. Three hours. Mr. Magnarella.

167 **NATIVE AND CONTEMPORARY PEOPLES OF CANADA** An exploration of the cultures of Canada's minorities—both native and immigrant; focuses on the background traditions of these minorities and the cultural conflicts engendered in the Canadian experience. *Prerequisite:* 21, or Geography 102, or History 214, or History 216. Three hours. Mr. Woolfson.

170 **PASTORAL PEOPLES** An examination of the social and economic organization of peoples whose main livelihood is the migratory herding of animals, against a backdrop of environmental pressures and participation in larger social systems. *Prerequisite:* 21. Three hours. Mr. Pastner.

175 **ETHNOGRAPHY OF ART** The analysis of the art of tribal and non-western peoples, with emphasis on the visual arts of Africa, Oceania and North American Indians. Particular attention is paid to the relation of art to social organization and ideological systems. *Prerequisite:* 21. Three hours. Ms. Pastner.

180 **CULTURAL ECOLOGY** Interrelationships of social groups and their natural environments and resource bases, with primary emphasis on non-industrial cultures. Empirical and theoretical materials from hunting-gathering, pastoral and peasant peoples will be examined from the perspectives of anthropology and geography. *Prerequisite:* 21 or Geography 11. Three hours. Messrs. Gade and Pastner (team taught).

193, 194 **COLLEGE HONORS**

195, 196 **SPECIAL TOPICS**

197, 198 **READINGS AND RESEARCH**

212 **CULTURE AND PERSONALITY** The cross-cultural comparison of personality development; the problem of delineating modal personality types. *Prerequisite:* Sociology 10, Anthropology 21 and one 100 level course in Sociology or Anthropology. Three hours. Messrs. Mabry, Magnarella, Steffenhagen.

225 **CURRENT ANTHROPOLOGICAL THEORY** Schools of Anthropological thought examined in relation to data on non-western societies and the historical and social context in which the anthropologist works. Included are Evolutionism, Cultural Ecology, Functionalism, Relativism, Diffusionism, Structuralism and the Cognitive school. *Prerequisite:* 21 plus one 100 level course. Three hours. Mr. Magnarella, Mr. Pastner, Ms. Pastner.

228 **SOCIAL ORGANIZATION** The study of social relationships of peoples living in various cultures and in different parts of the world; focuses on such topics as residence, descent and kinship in tribal organization and community life. *Prerequisite:* 21 and one 100 level course. Three hours. Messrs. Magnarella and Mitchell.

229 **POLITICAL AND ECONOMIC ANTHROPOLOGY** The analysis of traditional exchange and subsistence systems and the ways these relate to interest-based, or political behaviors. *Prerequisite:* 21 and one 100 level course. Mr. Pastner.

262 **CULTURAL GEOGRAPHY** (Same as Geography 262).

267 **THE FRANCO AMERICANS** A seminar designed to explore the cultural patterns of the French speaking peoples in New England, with particular reference to Vermont. Attention is paid to the persistence and change in traditional French Canadian Society and Culture in New England. Individual research projects are required. *Prerequisite:* permission of instructor. Three hours. Mr. Woolfson.

283 **CULTURE CHANGE** The study of Socio-cultural transformations in non-western countries with emphasis on such topics as industrialization, urbanization and modernization and their impact on the lives of previously traditional peoples. *Prerequisite:* 21 and one 100 level course, or 21 and six hours in the social sciences. Three hours. Mr. Magnarella.

284 **URBAN ANTHROPOLOGY** The study of urbanization and urban life in non-western countries including such topics as urban-rural ties, peasant migrations, and socio-cultural adjustment to urban living. *Prerequisite:* 21 and one 100 level course, or 21 and six hours in the social sciences. Three hours. Mr. Magnarella.

290 **SEMINAR** *Prerequisite:* twelve hours of Anthropology and senior standing. Three hours. Staff.

295-296 **ADVANCED SPECIAL TOPICS** *Prerequisite:* 21 and one 100 level course.

Area and International Studies

COLLEGE OF ARTS AND SCIENCES

Executive Committee: Professors Ambrose, Dellin, Felt (Director), Gould, Mabry, Miles, Murad, and Engroff.

Asian Studies: Professors Alnasrawi, A. Andrews, I. Andrews, Berninghausen, Brewer, Davison, Deming, Engroff (Chairman), Gussner, Leinbach, Little, Magnarella, Mitchell, S. Pastner, C. Pastner, Seybolt, Swanson, and Vandermeer.

Canadian Studies: Professors Geno, Haugen, Haynes, London, Metcalfe, Miles (Chairman), Muller, Stanfield, Thompson, Williams, Woolfson, and Young.

European Studies (Western, Northern, Mediterranean): Professors Ambrose (Chairman), Barnum, Bryan (Co-Chairman), Davison, Dellin, Dickerson, Felt, Hutton (Co-Chairman), Kinnard, Lewis, Martin, Metcalfe, Moneta, Perrin, Richel, Roland, Ugalde, and Whitebook.

Latin American Studies: Professors Doolan, Dowe, Finney, Gade, Gould, Haviland, Murad (Chairman), Sargent, Simon, Spinner, True, Ugalde, Weiger, Wesseling, Zarate.

Russian and East European Studies: Professors Basa, Daniels, Dellin, Flannery, Mabry (Chairman), Meeks, Nalibow, Pacy, Paganuzzi, and Staron.

General and other colleges: Professors Case, Hilberg, Kahn, Julow, Schmokel, Shiman, Stone, Tremblay, Vogelmann, and Webster.

193, 194 COLLEGE HONORS

195, 196 SPECIAL TOPICS

197, 198 READINGS AND RESEARCH

297, 298 SEMINAR Conducted by a team of area specialists and covering selected topics through interdisciplinary and comparative approaches. *Prerequisite:* permission by the executive committee of Area Studies. Other area courses are offered by the individual academic departments. For specific requirements for each area, consult the Chairman of the appropriate program or see page 87.

Art

COLLEGE OF ARTS AND SCIENCES

Professors J. Davison and R. Janson (Chairman); Associate Professor P. Aschenbach, W. Davison, F. Hewitt, W. Lipke; Assistant Professors E. Owre, M. Roland, E. Sherman, H. Okino; Instructors C. Fengler,** D. Higgins, L. Spivak, D. Versweyvel, J. Severtson, M. Zalkind-Schur, K. Howell, N. Mulick.*

*On leave Spring 1974

**On leave Fall 1973.

Studio Art

1 **INTRODUCTORY STUDIO** Introduction to visual thinking and awareness, projects focusing on basic concepts of two- and three-dimensional objects and images. Three hours. Staff.

2 **BASIC DRAWING** The structure and reconstruction of visual experience through drawing, and the traditional transformation of three-dimensional experiences on to a two-dimensional surface. Three hours. Staff.

3 **TWO DIMENSIONAL STUDIES** Primary concern with surfaces and imagery utilizing various aspects, depending on section and instructor, of painting, drawing, graphics and photography. Three hours. Staff.

4 **THREE DIMENSIONAL STUDIES** Exploration of manipulative materials and structural form, utilizing various aspects, depending on section and instructor, of sculpture and construction. Three hours. Staff.

NOTE: Art 1 will be closed to students with more than one of 2, 3, 4 while 3 or 4 may in certain cases be taken more than once if with a different instructor.

11 **INTRODUCTION TO FINE METALS** Exploration of the basic Fine Metals techniques; soldering, forging, forming, fusing, stone setting, and primitive casting methods and the application in finished pieces of personal design. *Prerequisite:* instructor's permission. Three hours. Spivak.

13 **INTRODUCTION TO CERAMICS** Basic design and practice in ceramics. Hand-built and thrown forms, firing and glazing. *Prerequisite:* instructor's permission. Three hours. Okino.

21, 22 **DRAWING** An intense investigation of drawing and elements that relate to the discipline. *Prerequisite:* 2. Three hours. Owre.

111, 112 **FINE METALS** Advanced techniques in enamels and silver jewelry. Independent work emphasizing design and skill. *Prerequisite:* 4 and permission. Three hours. Spivak.

113, 114 **CERAMICS** Advanced techniques in throwing and hand building. Clay and glaze technology, kiln theory and construction. *Prerequisite:* 4 and permission. Four hours. Okino.

121, 122 **PAINTING** The structure and process of the tradition of painting; with emphasis on the visualization of space and the dimensions and dynamics of color. *Prerequisite:* 1 or 2 and 3. Three hours. Hewitt.

131, 132 **PRINTMAKING: ETCHING AND SILKSCREEN** Including stencil, resist and photo-silkscreen. *Prerequisite:* 1 or 2 and 3 and instructor's permission, 131 for 132. Four hours. Davison.

133, 134 **PRINTMAKING: LITHOGRAPHY** Methods and materials in planographic printing, and lithography, stressing design and technical control. *Prerequisite:* 1 or 2 and 3 and instructor's permission, 133 for 134. Four hours. Davison.

141, 142 **SCULPTURE** Will deal with advanced explorations of manipulative materials. *Prerequisite:* 4 and one of 2, 21, 22. Three hours. Aschenbach.

151 **VISUAL ENVIRONMENT** An exploration of public spaces, structures, architectural detail, landscaping, roadways, lighting, etc. Field trips, meetings with planners, and architects, projects. *Prerequisite:* 1 or 2 and 3 or 4. Three hours. Owre.

161, 162 **PHOTOGRAPHY** An introduction to photographic processes as methods of seeing, on visual discovery through informed manipulation of materials. *Prerequisite:* 3. Three hours. Higgins.

193 **COLLEGE HONORS**

195 **SPECIAL TOPICS**

197 **READING AND RESEARCH** *Prerequisite:* departmental permission. Three hours. Staff.

281 **DIRECTED STUDIES** Individual or group studies in a special area. *Prerequisite:* six hours advanced in the chosen area and permission. Three hours. Staff.

Art History

5, 6 **ART HISTORY** Painting, sculpture, and architecture in the western world. First semester: Egyptian through Gothic; second semester: Renaissance to the present. *Prerequisite:* 5 for 6. Three hours. Roland.

9 **VISUAL STUDIES** A non-historical examination of visual experience, artifacts, buildings and environment, with focus on the distinction between aesthetic and ordinary visual data. Three hours. Lipke.

51 **GREEK ART** History of art in Greek lands in ancient times. Emphasis on sculpture, architecture, and vase painting. *Prerequisite:* sophomore standing. Three hours. J. Davison.

52 **ROMAN ART** Development of Roman art styles out of Greek forms. *Prerequisite:* sophomore standing. Three hours. Staff.

54 **MODERN ART** Painting and sculpture from French Impressionism to the present; emphasis on European influences. *Prerequisite:* sophomore standing. Three hours. Roland.

101 **MEDIEVAL ART** Art and architecture in western Europe from the Early Christian to early 15th Century. Emphasis on Romanesque and Gothic. *Prerequisite:* 6 or 51. Three hours. Roland.

102 **NORTHERN EUROPEAN ART 1400-1600** Netherlandish and German art of the period. Special attention to John van Eyck, Rogier van de Weyden, Hugo van de Goes, Durer, Bosch, and Bruegel. *Prerequisite:* 6. Three hours. Fengler.

103 **ITALIAN RENAISSANCE ART** Painting, sculpture and architecture in Italy, 1400-1600. *Prerequisite:* 6. Three hours. Fengler.

104 **BAROQUE ART** European art and architecture, 1600-1750. *Prerequisite:* 6. Three hours. Roland.

105 **ROCOCO AND ROMANTIC ART** European architecture, sculpture, and painting, circa 1750-1850, and the origins of the modern movement. *Prerequisite:* 6. Three hours. Fengler.

106 **MODERN ARCHITECTURE** Building and Design since 1850. Visits with architects and to modern buildings in the area. *Prerequisite:* 6 or 9. Three hours. Lipke.

107 **AMERICAN PAINTING** Painting in America from Colonial Times to the twentieth century. Use of the Fleming and Shelburne Museum collections. *Prerequisite:* 6. Three hours. Lipke.

108 AMERICAN ARCHITECTURE The Colonial Period to Frank Lloyd Wright. Research on buildings of historical interest in the area. *Prerequisite:* 6 or 9. Three hours. Janson.

109 ART SINCE 1945 Direction and background of recent American painting and sculpture, and parallel developments in Europe. *Prerequisite:* 54, advanced studies in studio, or instructor's permission. Three hours. Lipke.

194 COLLEGE HONORS

196 SPECIAL TOPICS

198 READINGS AND RESEARCH *Prerequisite:* departmental permission. Three hours. Staff.

207 STUDIES IN AMERICAN ART Selected areas of art and design, particularly as represented in the Fleming and Shelburne Museums. *Prerequisite:* By permission to students of Art History, American History or Literature. Three hours. Janson, Lipke.

210 STUDIES IN MODERN ART Topics in 19th and 20th century art, individual research and reports. *Prerequisite:* 105 or 6 and 54, and permission. Three hours. Roland, Lipke.

282 DIRECTED STUDIES Individual or group studies in a special area. *Prerequisite:* six hours advanced in the chosen area and permission. Three hours. Staff.

285, 286 MUSEUM STUDIES Contemporary museum techniques as concerning the research, care and administering of a collection (Fall) and as furthering aesthetic insight and the communication of ideas (Spring). *Prerequisite:* junior standing & instructor's permission. Three hours. Parris, Lipke.

Biochemistry

COLLEGE OF MEDICINE

Professors Lamden and Melville (Chairman); Associate Professors Meyer, Thanassi, Woodworth, and Wuthier; Assistant Professors Hart, Schofield, and Willard; Instructor Ishikawa.

102 BIOCHEMICAL ANALYSIS (2-4) Lectures, conferences, and laboratory exercises concerned with the theory and techniques of importance in the quantitative analysis of biological materials. Primarily for students of medical technology but open to others with permission of the department chairman. *Prerequisite:* Chemistry 1-2. Four hours. Mr. Lamden.

191, 192 UNDERGRADUATE RESEARCH Participation in a research program currently being pursued by a faculty member of the Department. A written report is due at the end of each semester. *Prerequisite:* Chemistry 1, 2 or 11, 12. Some programs may require additional courses in chemistry. Credit as arranged, up to 4 hours per semester. Staff.

204 INSTRUMENTATION LABORATORY (1-3) Primarily for medical technology students. The practical aspects of the operation of analytical instruments used in biochemical research and clinical chemistry. Mechanical, optical, and electrical

features of selected instruments are studied as an aid to their proper use and maintenance. *Prerequisite:* Biochemistry 102 or 211-212, or equivalent experience in biochemical laboratory work. Two hours. Messrs. Melville and Woodworth.

211-212 **BIOCHEMISTRY FOR HEALTH SCIENCES (2-4)** Primarily for medical technology students. Lectures provide a comprehensive study of mammalian biochemistry particularly as it relates to man. Medically-oriented experiments utilizing modern clinical chemistry techniques are performed in the laboratory. Case studies from the files of the MCHV are used to correlate lecture and laboratory material. *Prerequisites:* Biochemistry 102 or quantitative chemistry; organic chemistry. Physiology is strongly recommended. Four hours per semester. Ms. Hart.

Botany

COLLEGE OF AGRICULTURE

Professors Dodge,¹ Gershoy,² Hyde (Chairman), Klein, Marvin,² Sproston,² Taylor and Vogelmann; Associate Professors Cook and Etherton; Assistant Professor Worley; Adjunct Assistant Professor Jagels.

Biology

1, 2 **PRINCIPLES OF BIOLOGY (3-3)** Introduction to the structure, functions, and evolution of animals and plants. Emphasis on concepts important for advanced study in a Life Science and for understanding the biological world of which man is a part. *Prerequisite:* 1 for 2. Four hours. Botany and Zoology Staffs.³

3 **BIOLOGY AND MAN** An introduction for nonscience majors. Selected biological topics relevant to man such as cancer, human genetics, environmental toxicants; and biological principles and concepts necessary for an understanding of these problems. Three hours. Botany and zoology staffs.³

Botany

4 **INTRODUCTION TO PLANT BIOLOGY (3-3)** An introduction to structure, function, and reproduction of vascular plants in terms of the dynamics of plant life. Practical implications of basic botanical information in the applied plant sciences. Four hours. Staff.³

6 **THE GREEN WORLD** A survey of the plant world. Esthetic, cultural, social, medical, and historical aspects of plant biology. Three hours. Mr. Klein.

101 **GENETICS** (see Biology 101.)

104 **PHYSIOLOGY OF THE PLANT BODY (3-3)** Study of the plant as a whole,

¹Visiting professor.

²Emeritus.

³Credit will not be given for both Biology 1, 2 and Botany 4. Credit will not be given for both Biology 1, 2 and Biology 3. Botany and Zoology majors will not receive credit for Biology 3.

growth and development, water and mineral relations, environmental factors, and regulatory processes. *Prerequisites:* 4 or Biology 1, 2; Chemistry 1, 2. Four hours. Mr. Etherton.

105 PLANT DIVERSITY (3-3) A survey of major plant groups. Structural and developmental changes associated with the evolution of vascular plants. *Prerequisite:* 4 or Biology 1, 2. Four hours. Mr. Taylor.

109 SYSTEMATICS AND PHYLOGENY (2-3) Classification; evolution of flowering plants; characterization and recognition of major families; species and generic concepts; biosystematics; taxonomic keys; preparation of herbarium specimens. *Prerequisite:* 4 or Biology 1, 2. Three hours. Mr. Vogelmann.

117 PLANT PATHOLOGY (2-2) Diagnosis, life history, and control of plant diseases caused by fungi, viruses, bacteria and nematodes. *Prerequisite:* 4 or Biology 1, 2. Three hours. Staff.

151 PLANTS AND MAN The place of plants in man's affairs. The influence of plants on exploration, migration and the development of civilizations. The role of plants in the world today, with special emphasis on food, drug, fiber and other useful plants and on the botanical features which contribute to their usefulness. *Prerequisite:* Principles of Biology or Botany 4. Three hours. Mr. Taylor.

152 PLANT ANATOMY AND HISTOLOGY (2-4) Development of the organism and accompanying integration of cellular tissues. Ontogeny of vegetative tissues; modifications of the cell wall. *Prerequisite:* 4 or Biology 1, 2. Four hours. Mr. Taylor. Alternate years, 1974-75.

160 GENERAL ECOLOGY Analysis of the environment and its effects upon organisms; interrelationships among organisms; ecological adaptations. *Prerequisite:* 4 or Biology 1, 2. Three hours. Mr. Worley.

162 GENERAL ECOLOGY LABORATORY (0-3) Field work and experiments to illustrate concepts presented in Botany 160. *Prerequisite:* previous or concurrent enrollment in 160. One hour. Mr. Worley.

193, 194 HONORS IN BOTANY

197, 198 UNDERGRADUATE RESEARCH AND APPRENTICESHIPS Individual projects under the direction of a faculty member. The project may involve original research, readings, or apprenticeships. *Prerequisite:* junior standing. Three to six hours.

201 ELECTRON MICROSCOPY (2-4) Theory and practice of electron microscopy including microscope operation, specimen preparation, and interpretation of electron micrographs. *Prerequisite:* departmental permission. Four hours. Mr. Jagels.

205 MINERAL NUTRITION OF PLANTS (see Plant and Soil Science 205).

207 WATER RELATIONS OF PLANTS (see Forestry 207).

213 PLANT COMMUNITIES (2-2) Plant sociology; structure and organization of the plant community; sampling methods and analysis of data; climatic and edaphic factors; field work. *Prerequisite:* 109 or departmental permission. Three hours. Mr. Vogelmann. Alternate years, 1975-76.

232 BOTANY FIELD TRIP Trips to selected environments outside Vermont. Led by several faculty members representing different fields of Botany. Emphasis will be on overall, integrated approach to ecology, structure, and function. One hour. Staff. Christmas or spring vacation or end of school year.

250 **MICROTECHNIQUE (1-4)** Theory and practice in the preparation of biological materials for anatomical and cytological study, including histochemistry and photomicrography. *Prerequisite:* introductory chemistry; some knowledge of organic chemistry, anatomy, or cytology is desirable. Three hours. Mr. Cook and Mr. Jagels. Alternate years, 1974-75.

253 **MYCOLOGY (2-4)** Reproductive processes and classification of the common mushrooms, molds, and yeasts. Physiological studies; antibiosis. *Prerequisite:* Chemistry 131, 132 or departmental permission. Four hours. Staff. Alternate years, 1975-76.

255 **MOLECULAR GENETICS OF EUCARYOTES** Advanced analysis of recombination in plants and animals. Molecular nature of meiotic processes and control of gene expression with particular reference to the nucleolus. *Prerequisites:* 101; Chemistry 16 or 131, 132. Three hours. Mr. Hyde.

256 **CYTOLOGY** Principles of structure in biological macro-molecules and cellular organelles such as membranes, chloroplasts, and chromosomes. Their composition, origin and relationship between their structure and function. *Prerequisites:* Biology 103 or permission of the instructor; Chemistry 16 or 131, 132. Three hours. Mr. Hyde.

257 **PHYSIOLOGY OF THE PLANT CELL (3-2)** Detailed study of photosynthesis, plant cell membrane function, and plant cell growth. *Prerequisites:* Botany 104, Chemistry 131, 132 or Chemistry 16, Physics 11, 12 or 15, 16. Four hours. Mr. Etherton.

259 **PLANT GROWTH AND DEVELOPMENT (3-3)** Chemical and physical factors regulating growth and development of plant tissues and the plant body. Morphogenesis and differentiation. *Prerequisites:* 104, departmental permission. Four hours. Mr. Klein. Alternate years, 1974-75.

260 **PHYCOLOGY (2-4)** The morphology, classification, and general biology of the algae, with special consideration of the freshwater forms. *Prerequisite:* 105, or two courses in zoology or botany above 100. Four hours. Mr. Cook. Alternate years, 1975-76.

261 **PLANT CYTOGENETICS** Chromosome behavior and evolution in higher plants. Origin of cultivated plants particularly by polyploidy. Chromosome rearrangements as tools in genetic analysis. *Prerequisite:* Biology 101. Three hours. Mr. Hyde. Alternate years, 1974-75.

281, 282 **BOTANY SEMINAR** A topical seminar consisting largely of presentations of personal research by faculty and graduate students from within and outside the University. May be jointly sponsored with related departments. Required attendance of botany graduate students and seniors in botanical research programs. Without credit. Staff.

295 **SPECIAL TOPICS** *Prerequisite:* permission of the department.

Business Administration

COLLEGE OF ENGINEERING, MATHEMATICS AND BUSINESS ADMINISTRATION

Professors Greif, Nyquist and Severance (Chairman); Associate Professors

Gross, Laber, Michael, and Squire; Assistant Professors Battelle, Gatti, Kuklis, Schermerhorn, and Tashman; Instructors Erdmann, Kittell, and Rose; Adjunct Instructors Aronson, Flynn and Lavigne.

17, 18 **BUSINESS LAW** First semester: concepts of law as related to business, including law of contracts, sales, bailments, and negotiable instruments. Second semester: business and laws of agency, partnerships and corporations. Three hours. Staff.

40 **INTRODUCTION TO QUANTITATIVE METHODS IN MANAGEMENT** The fundamental deterministic models used by managers as aids in decision making. Attention is given to the logic underlying each model, and a working knowledge of logarithms, exponential equations, calculus, linear algebra, and probability theory is developed. *Prerequisite:* 2 years of high school algebra. Four hours. Staff.

See course Mathematics 40.

42 **COMPUTERS IN MANAGEMENT (2-2)** The two weekly lectures are identical to those of Math 115, but students enrolling in 42 attend separate labs where programming problems with business applications will be examined. Business Credit will not be given without completion of the Business labs. Three hours. Staff.

See course Mathematics 115.

54 **FOUNDATIONS OF MARKETING** The place of marketing in our economy. Analysis of the marketing structure by functions, institutions and commodities. Three hours. Messrs. Greif and Kuklis.

60 **FINANCIAL ACCOUNTING (3-2)** An introduction to generally accepted accounting principles and techniques regarding corporations partnerships and proprietorships, as they apply to income determination and financial position presentation. Four hours. Staff.

61 **MANAGERIAL ACCOUNTING (3-2)** Introduction to the use of accounting for planning, cost behavior and control, and decision making. *Prerequisite:* 60. Four hours. Staff.

70 **HUMAN RELATIONS IN ORGANIZATIONS** A study of the human factors which should be considered by administrators when planning organizational activities and structure. Three hours. Mr. Schermerhorn.

131 **PUBLIC UTILITIES** A study of the principles and methods of public utility regulation in the United States. Electric and telephone utility regulation is examined in detail. *Prerequisite:* 60, Economics 11, 12. Three hours. Mr. Laber.

132 **TRANSPORTATION** A study of the social and economic aspects of transportation problems, covering an analysis of the nature, history, development and regulation of the transportation system in the United States. *Prerequisite:* Economics 11, 12. Three hours. Mr. Squire.

133 **GOVERNMENT AND BUSINESS** The role of government in the private sector. Emphasis is placed on the problem of industrial concentration, the history and enforcement of anti trust legislation, and the conflicting goals of economic efficiency and political feasibility. *Prerequisite:* Economics 11. Three hours. Mr. Squire.

140 INTRODUCTION TO DECISION MAKING UNDER UNCERTAINTY Probability models as applied to the optimal choice among alternative actions or strategies when outcomes are uncertain. Sample information is handled using Bayesian techniques to revise prior probability distributions. *Prerequisite:* 40 or equivalent. Three hours. Mr. Gross.

144 ELEMENTS OF STATISTICS (3-1) See Course Statistics 111.

151 PRINCIPLES OF MARKETING MANAGEMENT Focus on the major types of decisions facing the marketing executive. Emphasis on developing the analytical content of marketing. Case application also included. *Prerequisite:* 54, Economics 11. Three hours. Messrs. Greif and Kuklis.

153 PERSONAL SELLING AND SALES FORCE MANAGEMENT Personal Selling as a communication activity. Behavioral sciences are explored. Sales Organization, coordination of related department functions, methods of selecting, testing, training, compensating and controlling are considered. Individual projects. *Prerequisite:* 151. Three hours. Mr. Greif.

156 THE MARKETING OPERATIONS OF SMALL RETAIL AND SERVICE ESTABLISHMENTS An understanding of the primary elements of marketing management involved in the practical planning and operating decision problems facing the retailer. *Prerequisite:* 54. Three hours. Mr. Greif.

157 MARKETING RESEARCH The role of research in a marketing information framework. Emphasis on data collection methodology. *Prerequisite:* 40, 144, 151. Three hours. Mr. Kuklis.

158 FUNDAMENTALS OF ADVERTISING Principles and techniques of copy, layout, media selection and campaign development. Actual preparation of advertisements. *Prerequisite:* 54 or consent of instructor. Three hours. Mr. Kuklis.

161-162 INTERMEDIATE ACCOUNTING Principles, concepts, techniques and issues involved in accounting for the assets, liabilities and owners equity and their related effect on income determination of an enterprise. *Prerequisite:* 61 for 161; 161 for 162. Three hours. Messrs. Battelle and Michael.

164 BASIC FEDERAL TAXES An examination of the Internal Revenue Code primarily regarding income tax law for individuals, and partnerships. Corporate, estate, and trust tax law will be introduced. *Prerequisite:* 60. Three hours. Mr. Michael.

173 OPERATIONS ANALYSIS This course presents an overview of the organization, the firm, the interrelationship of functions, and the fundamental principles of management. The major orientation of the course being in production. *Prerequisite:* 40, 42, 61, 70, 144 and Economics 11. Three hours. Mr. Squire.

180 MANAGERIAL FINANCE I The financial function in the corporation is described. Techniques for evaluating current uses of resources and proposed resource acquisitions or dispositions are covered. Fund raising and disbursement practices are studied. *Prerequisite:* 61, Economics 11, 12. Three hours. Messrs. Laber and Gross.

184 FINANCIAL INSTITUTIONS AND MARKETS Financial institutions and credit allocation, determinants of the level and term structure of interest rates, and characteristics of financial institutions and markets. *Prerequisite:* 60, Economics 11, 12. Three hours. Messrs. Severance and Gatti.

185 COMMERCIAL BANK MANAGEMENT Problems facing bank managers are examined and solution techniques developed. Specific topics include asset selection, liability management, bank accounting systems, and the regulatory system. *Prerequisite:* 184. Three hours. Mr. Severance.

191 SENIOR SEMINAR IN INTERFUNCTIONAL DECISION ANALYSIS A variety of important managerial decision questions are examined. The viewpoint is global rather than functional. Problems addressed include make or buy, plant location, product addition, and expansion. *Prerequisite:* Senior standing. Three hours. Staff.

242 MANAGEMENT INFORMATION SYSTEMS The problems of designing business information processing systems. Manual and computer based systems are evaluated in terms of cost versus effectiveness. Systems design and programming projects are undertaken using the COBOL language. *Prerequisite:* 42 and 173. Three hours. Mr. Gross.

245 INTRODUCTION TO OPERATIONS RESEARCH Application of quantitative techniques to the formulation and solution of management decision problems. Topics include linear programming applications, inventory management, and service center cost-effectiveness measurement. *Prerequisite:* 40, 42, and 144. Three hours. Mr. Gross.

257 CONSUMER BEHAVIOR An exploration and evaluation of the body of research evidence from marketing and the behavioral sciences relevant to a theory of consumer behavior. Emphasis is also given to research methodologies employed. *Prerequisite:* 157. Three hours. Mr. Kuklis.

258 CURRENT MARKETING DEVELOPMENTS Discovery and analysis of both internal and environmental changes affecting marketing theory and practice. Topics include: social change, functional and institutional marketing system change, and legislative and regulatory trends. Individual research projects required. *Prerequisite:* 151. Three hours. Mr. Greif.

259 MARKETING MANAGEMENT The use of advanced cases to aid in the formulation of overall policies and planning strategies for marketing programs. Topics include product planning and channel selection. *Prerequisite:* 151. Three hours. Mr. Greif.

264 FUND ACCOUNTING Study of accounting principles and practices of governmental organizations including appropriation systems, funds, revenues accounting for other non profit organizations, and third party reimbursement accounting for Medicare and health insurance intermediaries. *Prerequisite:* 161-162 or experience in public administration. Three hours. Mr. Michael.

265 ACCOUNTING THEORY Study of underlying concepts, principles and structure of accounting theory. Topics covered include financial accounting standards, opinions of the APB, professional literature and current applications. *Prerequisite:* 162. Three hours. Mr. Battelle.

266 ADVANCED ACCOUNTING Accounting for partnerships, special sales contracts, parent-subsidiary relationships, Fiduciary relationships and governmental units. *Prerequisite:* 162. Three hours. Mr. Nyquist.

267 AUDITING Study of the C.P.A. as an independent auditor. Topics covered include standards, ethics and legal responsibilities of the profession, financial statements, audit concepts and techniques, and the audit opinion. *Prerequisite:* 266. Three hours. Mr. Battelle.

268 **COST ACCOUNTING** Accounting for inventory valuation and income determination, non routine decisions, policymaking and long range planning. *Prerequisite:* 61. Three hours. Mr. Nyquist.

269 **C.P.A. PROBLEMS** Review of questions and problems from past C.P.A. examinations coupled with a study of the Opinions of the Accounting Principles Board. *Prerequisite:* 266. Three hours. Mr. Nyquist.

271 **PERSONNEL ADMINISTRATION** The personnel function in organizations; selecting and training employees job analysis and evaluations; and wage administration. *Prerequisite:* 70 or Economics 141. Three hours. Mr. Nadworny.

274 **MANAGEMENT PROBLEMS AND POLICIES** This course is designed for graduate students and advanced (senior) undergraduates, through the medium of actual case studies, to experience the process of determining appropriate policies and strategies when faced with a complex of conflicting or incompatible goals and techniques. *Prerequisite:* 151, 173, and 180. Three hours. Mr. Squire.

275 **ORGANIZATION THEORY** An analysis of organization structure and behavior under static and steady state conditions. Control and adaptation processes are studied to show how organizations adjust to internal and external changes. *Prerequisite:* 70, 173. Three hours. Mr. Schermerhorn.

280 **MANAGERIAL FINANCE II** This course develops advanced theories of capital budgeting, design of capital structure, and calculation of cost of capital. The requirements of a financial system appropriate to modern organizational needs are studied. *Prerequisite:* 180. Three hours. Mr. Laber.

281 **FINANCIAL MANAGEMENT IN THE PUBLIC SECTOR** Public sector budgeting and revenue-raising systems are viewed from economic and managerial perspectives. Topical coverage includes: budget formulation, planning-programming-budgeting systems, public sector manpower planning, accounting and information systems, sources of tax revenue, bond financing, and intergovernmental financial linkages. *Prerequisite:* 180. Three hours. Mr. Tashman.

282 **INVESTMENT ANALYSIS** Methods of evaluating investment opportunities in real and financial assets. Adaptation of investment standards to changing conditions is stressed. Students evaluate specific corporate securities as investments. *Prerequisite:* 180. Three hours. Messrs. Gross and Battelle.

283 **FINANCIAL MANAGEMENT OF INTERNATIONAL OPERATIONS** Theories and practices of international financial management are examined. Topics investigated include: systems of international exchange, spot and forward markets, and expropriation and exchange risk as parameters in investment and financial decisions. Cases used. *Prerequisite:* 180, 184. Three hours. Mr. Gatti.

297, 298 **SEMINAR** Review of recent books and periodical literature; discussions and reports on topics of contemporary interest. *Prerequisite:* permission of the department. Three hours. Staff.

Chemistry

COLLEGE OF ARTS AND SCIENCES

Professors Gregg, Flanagan, Kice (Chairman), Krapcho, Kuehne, White and Wulff; Associate Professors Allen, Brown and Strauss; Assistant Professors Geiger, Sayer and Wellin; Instructor Jenkins.

Note: Credit cannot be granted for: 1, 2 and also 11, 12; 3, 4 and also 1, 2; 140 and also 141, 142.

1, 2 INTRODUCTORY CHEMISTRY (3-3) The important principles, ideas and concepts of general chemistry. Either this course, or Chemistry 11, 12 should be elected by all students planning subsequently to take any 100 level course in chemistry. *Prerequisites:* 1 or 11 for 2. Four hours. Staff.

3 OUTLINE OF GENERAL CHEMISTRY (3-3) A one-semester course in the principles, ideas and concepts of general chemistry, with particular emphasis on those aspects of the subject of importance to the biological and health sciences. Four hours. Staff.

4 OUTLINE OF ORGANIC AND BIOCHEMISTRY (3-3) A brief introduction to some of the important and interesting aspects of organic and biochemistry. Credit cannot be granted for both Chemistry 4 and 16. *Prerequisite:* Chemistry 1, 3, 5 or 11. Four hours. Staff.

5 CONCEPTS OF CHEMISTRY (3-3) A one-semester course in the principles, ideas and concepts of general chemistry for students in engineering programs. Four hours. Staff.

7 EARTH, AIR, FIRE AND WATER (3-3) An introductory course intended for non-science majors. It deals with man's chemical understanding of his surroundings. Concepts of energy, structure, and change as related to the observable universe. Emphasis on understanding topics of current interest and on the chemical interpretation of biological systems. Four hours. Staff.

11, 12 GENERAL CHEMISTRY (3-6) Includes general experiments in elementary qualitative and quantitative analysis. Recommended for those concentrating in chemistry or physics. *Prerequisites:* one year of high school chemistry and concurrent enrollment in Mathematics 11 or 13 for Chemistry 11. Chemistry 11 for 12. Five hours. Staff.

13, 14 THE CHEMICAL BOND Nature of interatomic and intermolecular forces. Stereochemistry, bond energies, and crystal structures are considered. *Prerequisite:* 1, 2 or 11, 12. One hour. Mr. Gregg.

16 INTRODUCTORY ORGANIC CHEMISTRY (3-3) A one-semester introduction to the more important and interesting aspects of organic chemistry. (Does not satisfy medical school entrance requirements regarding undergraduate preparation in organic chemistry.) Credit cannot be granted for both Chemistry 16 and 4. *Prerequisite:* Either Chemistry 1, 3, 5 or 11. Four hours. Staff.

123 QUANTITATIVE ANALYSIS (3-3) Theory and practice of gravimetric and volumetric methods of analysis. Theoretical discussion of indicators, buffers, pH, etc. *Prerequisite:* 1, 2. Not open to students with credit for 11, 12. Four hours. Staff.

131, 132 ORGANIC CHEMISTRY (3-3) Organic chemistry for chemistry majors, premedical students, and those concentrating in the biological and physical sciences. *Prerequisite:* 1, 2 or 11, 12; 131 for 132. Four hours (may be taken without laboratory for three hours credit by chemistry majors who intend to enroll in 134 and 135). Messrs. Krapcho, Kice and Kuehne.

134 ORGANIC CHEMISTRY LABORATORY (0-6) Laboratory practice in organic synthesis with an emphasis on separation and purification procedures. Introduction to spectral methods of structure identification. *Prerequisite:* 131. Two hours. Messrs. Krapcho and Kuehne.

135 ADVANCED ORGANIC CHEMISTRY LABORATORY (0-6) Chemical and physical methods of identifying organic compounds. Advanced synthetic and separation procedures. *Prerequisite:* 131, 134. Two hours. Messrs. Krapcho and Kuehne.

140 PHYSICAL CHEMISTRY FOR BIOLOGICAL SCIENCE STUDENTS Aspects of physical chemistry most pertinent to work in the biological sciences: acid-base equilibrium, theory of solutions, thermodynamics and kinetics. *Prerequisite:* 2, physics 16. Three hours. Mr. Flanagan.

141, 142 PHYSICAL CHEMISTRY Elementary quantum chemistry, introduction to statistical mechanics, thermodynamics, properties of solutions and chemical kinetics. *Prerequisite:* 2 or 12; physics 16; mathematics 123 or 121 for 141. Three hours. Messrs. Weltin, Flanagan and Wulff.

201, 202 ADVANCED CHEMISTRY LABORATORY (1-8) Modern analytical, physical and synthetic techniques. Syntheses requiring advanced methods such as controlled atmosphere box, autoclave, photochemical reactor, etc. Selected basic physical chemistry experiments. Development of techniques used for measurement of a variety of phenomena, e.g. thermochemistry, kinetics, electrochemistry, spectroscopy. Students wishing to take one semester only may concentrate in a particular area of interest, such as instrumental analysis. *Prerequisite:* 11, 12 or 123; credit for or concurrent enrollment in 141 and 142. Four hours. Mr. Geiger.

212 ADVANCED INORGANIC CHEMISTRY Structure, bonding, and reactions of inorganic compounds. Ionic compounds, the lanthanides; theories of acids and bases; electron-deficient bonding; covalent bond chemistry; simple models for structure prediction; introduction to crystal field theory; substitution reactions of transition metal complexes. *Prerequisite:* 142 or equivalent. Three hours. Messrs. Allen and Brown.

213 ADVANCED INORGANIC CHEMISTRY Application of symmetry concepts to inorganic chemistry; ligand field theory and electronic spectra; multiply-bonded systems; metal carbonyls; introduction to organometallic chemistry; biologically important inorganic complexes. *Prerequisite:* 212. Three hours. Messrs. Allen and Brown.

223 CHEMICAL INSTRUMENTATION The design and usage of modern instruments to facilitate chemical research. Topics such as temperature measurement and control, pH measurement and control, pressure measurement and control, etc., will be discussed. Three hours. Staff. Offered as occasion warrants.

231 PHYSICAL ORGANIC CHEMISTRY-PRINCIPLES Structure-reactivity relationships, molecular properties and their interpretation. Methods and results of investigations of mechanisms of common organic reactions. *Prerequisites:* 132; 142 or 247 or permission of instructor. Three hours. Messrs. White, Strauss or Krapcho.

235 MOLECULAR ORBITAL THEORY An introduction to the Huckel molecular orbital method. Energy levels and orbitals, molecular properties and their interpretation. Effects of substituents on electronic structure. Extensions of the Huckel method. *Prerequisites:* 132, 142, or equivalent. Three hours. Mr. Weltin.

242 CHEMICAL KINETICS AND MECHANISMS Theoretical and experimental aspects of chemical kinetics. Use of kinetics to deduce mechanisms of organic and inorganic reactions. Gaseous reactions, catalysis, isotope and solvent effects, chain reactions and very fast reactions. *Prerequisite:* 141, 142. Three hours. Messrs. Flanagan, Kice, Krapcho and White.

246 FUNDAMENTALS OF SPECTROSCOPY A general discussion of molecular spectroscopy, rotational and vibrational states of molecules, symmetry of vibrations; introduction to electronic spectra. *Prerequisite:* 141, 142, mathematics 124 or permission of the instructor. Three hours. Mr. Weltin. Alternate years.

247 INTRODUCTION TO QUANTUM MECHANICS General considerations of quantum mechanics. Development of techniques pertinent to the application of quantum mechanics to chemical problems. *Prerequisite:* 141, 142 or equivalent. Three hours. Hr. Weltin.

248 CHEMICAL THERMODYNAMICS Systematic study of the application of thermodynamics to chemical problems. Concepts of statistical thermodynamics to be introduced. *Prerequisite:* 141, 142 or equivalent. Three hours. Mr. Wulff.

249 STATISTICAL MECHANICS Development of statistical mechanics and its application to problems of chemical interest. *Prerequisite:* 141-142 or equivalent; 247 recommended. Three hours. Mr. Flanagan. Alternate years.

251, 252 ADVANCED ORGANIC CHEMISTRY Detailed discussion of fundamental principles and reactions in organic chemistry. Stereochemistry, conformational analysis, ring strain, reactivity criteria in the main reaction classes, reaction mechanisms, and important synthetic methods are discussed. *Prerequisite:* 131, 132, credit for or concurrent enrollment in 141, 142, 251 for 252. Three hours. Messrs. Kuehne, Krapcho, and Strauss.

282 ORGANOMETALLIC CHEMISTRY A systematic survey of the syntheses, properties, structures, bonding and reactions of organometallic compounds. Variation of the structure and stability of the metal-carbon bond throughout the periodic system. *Prerequisite:* 212. Three hours. Messrs. Allen and Brown. Alternate years, 1974-75.

284 PHYSICAL INORGANIC CHEMISTRY Ligand field theory, magnetic properties, magnetic resonance techniques (NMR, ESR, and NQR), Mossbauer spectroscopy, and optical activity. *Prerequisites:* 213 or equivalent, 246 or permission of the instructor. Three hours. Alternate years. Mr. Allen.

Seminars are required of graduate students and seniors concentrating in chemistry.

184 SENIOR SEMINAR Oral and written presentation of a subject of current chemical interest. *Prerequisite:* audit of 381. One hour. Staff.

197, 198, 199 UNDERGRADUATE RESEARCH Special study in inorganic, physical, or organic chemistry and with an assigned staff member. Findings submitted in written form. *Prerequisite:* 1, 2 or 11, 12 and departmental permission. Credit as arranged with a maximum of four hours per semester and twelve hours for the undergraduate program. 197 is offered in the fall, 198 in the spring, and 199 in the summer.

Chinese

COLLEGE OF ARTS AND SCIENCES

Messrs. Swanson, Berninghausen and Staff

1-2 **ELEMENTARY CHINESE** A study of Mandarin Chinese designed to give the beginning student the fundamental grammar and vocabulary for speaking, reading and writing the modern national language. Four hours. Mr. Berninghausen.

11, 12 **INTERMEDIATE CHINESE** A continuation of Chinese 1-2 designed to enable the student to converse in everyday Chinese, and to read and write simple texts. *Prerequisite:* Chinese 2 or equivalent. Four hours. Mr. Berninghausen.

21, 22 **INTRODUCTION TO CLASSICAL CHINESE** An introduction to pre-Han classical Chinese literature. Emphasis will be on syntax, sentence structure, and style of various authors. *Prerequisite:* Chinese 2 or permission of the instructor. Three hours. Mr. Swanson.

Advanced Chinese by arrangement.

Classics

COLLEGE OF ARTS AND SCIENCES

Professors Ambrose (Chairman), Bliss, Davison, and Gilleland; Associate Professor Schlunk; Visiting Assistant Professor Francis E. Romer.*

Greek

(There are no prerequisites to any Greek course. Students who have previously studied Greek should consult the department.)

1-2 **ELEMENTARY GREEK** Four hours. Staff.

11, 12 **INTERMEDIATE GREEK** Review of syntax. Readings from Plato, Herodotus, Euripides and Homer. Three hours. Staff.

111, 112 **PROSE COMPOSITION** Required of students who concentrate in Greek. Greek 111: one hour. Greek 112: two hours. Staff.

193, 194 **COLLEGE HONORS**

195, 196 **SPECIAL TOPICS**

197, 198 **READINGS AND RESEARCH**

201 **GREEK ORATORS** Three hours. Mr. Gilleland. Alternate years, on demand.

202 **GREEK COMEDY** Three hours. Mr. Ambrose. Alternate years, 1974-75.

203 **GREEK HISTORIANS** Three hours. Mr. Bliss. Alternate years, on demand.

*On sabbatical 1974-75.

204 GREEK TRAGEDY Three hours. Mr. Ambrose. Alternate years, on demand.

205 GREEK PHILOSOPHERS Three hours. Mr. Schlunk. Alternate years, on demand.

206 GREEK EPIC Three hours. Miss Davison. Alternate years, on demand.

Latin

(There are no prerequisites to any Latin course. Students who have had two years of high school Latin normally enroll in Latin 5 or Latin 12. Those who have had more normally enroll in Latin 101. Students with two years of high school Latin may take Latin 1 for credit only by departmental permission and only if the two years were taken two years prior to entrance into the University.)

1, 2 ELEMENTARY LATIN For students who present less than two years of high school Latin. Four hours. Staff.

5 ADVANCED ELEMENTARY LATIN Extensive review of Latin syntax. Selections from prose writers. Three hours. Staff.

12 INTERMEDIATE LATIN Selections from Vergil and Ovid. Three hours. Staff.

101, 102 SURVEY OF LATIN LITERATURE Selections from the principal Roman authors. Three hours. Staff.

111, 112 LATIN PROSE COMPOSITION Required of students who major in Latin and of those who wish to be recommended to teach Latin. Latin 111: one hour. Latin 112: two hours. Staff.

193, 194 COLLEGE HONORS

195, 196 SPECIAL TOPICS

197, 198 READINGS AND RESEARCH

203 REPUBLICAN PROSE Three hours. Mr. Gilleland.

204 EPIC POETS Three hours. Mr. Ambrose.

227 ROMAN LYRIC POETS Three hours. Mr. Schlunk. Alternate years, 1974-75.

251 ROMAN LETTERS Three hours. Mr. Bliss. Alternate years, on demand.

252 COMEDY Three hours. Mr. Bliss. Alternate years, on demand.

253 ROMAN ORATORY Mr. Gilleland. Alternate years, on demand.

255 HISTORIANS OF THE EMPIRE Three hours. Miss Davison. Alternate years, 1974-75.

256 SATIRE Three hours. Mr. Gilleland. Alternate years, on demand.

271 SILVER LATIN Three hours. Mr. Bliss. Alternate years, on demand.

Courses Requiring No Knowledge of Greek and Latin

Greek 32 MYTHOLOGY¹ Greek myth in literature, art, and music from antiquity to modern times. No prerequisites. Three hours. Mr. Ambrose.

¹This course may be used towards the distribution requirement of the College of Arts and Sciences in either category A or B.

Greek 151 GREEK DRAMA IN TRANSLATION Three hours. Staff. On demand.

Greek 153 GREEK HISTORIANS IN TRANSLATION Three hours. Staff. On demand.

Latin 32 ETYMOLOGY² Derivation of English words from Greek and Latin bases. Training in analysis of unfamiliar words, special attention to scientific vocabulary. Three hours. Staff.

Latin 152 ROMAN EPIC IN TRANSLATION Three hours. Staff. On demand.

Latin 154 ROMAN SATIRE IN TRANSLATION Three hours. Staff. On demand.

See also: Art 51 (Greek Art) and Art 52 (Roman Art); European Studies; General Literature 151 (Development of Prose Fiction); History 9 (Ancient Mediterranean Civilization), 105 (Ancient Near East), 106 (Greek History), and 107 (Roman History).

For The Teaching of Latin, see Secondary Education 179.

Prizes from endowed funds are awarded to outstanding graduating seniors and outstanding students in sophomore Latin.

V Communication and Theatre

COLLEGE OF ARTS AND SCIENCES

Professors Feidner, Huber, Lewis, London (Chairman), Luse, and Manchel; Associate Professors Schenk and Wilson; Assistant Professors Bryan, Cronin, Haynes, Howell, Lyon, Toomey, Waite, Williams, Worden, and Yadav; Instructors Cover, Dilley, Dillsaver, Orth, and Petry; Lecturers Houghton and Smith; Coordinators Daruvala and M. Toomey.

Communication and Public Address

1 FOUNDATIONS OF COMMUNICATION Three hours. I, II. Mr. Smith and Staff.

3 PARLIAMENTARY PROCEDURE *Prerequisite:* sophomore standing. One hour. Mr. Huber.

11 PUBLIC SPEAKING Three hours. I, II. Staff.

14 GROUP DISCUSSION Theory and performance in small group communication, including preparation, language, leadership, analysis, reasoning, organization and interpersonal relations. Three hours. I, II. Staff.

31 ORAL INTERPRETATION OF LITERATURE A study of communicating orally to an audience, from the printed page, the meaning and beauty of a literary work. Three hours. I, II. Staff.

32 ORAL INTERPRETATION OF LITERATURE *Prerequisite:* 31 for 32. Three hours. 32 may be repeated up to 9 credit hours. Staff.

²This course may be used towards the distribution requirement of the College of Arts and Sciences in category A as part of the non-foreign language courses.

81 VOICE AND ARTICULATION Elements of speech and phonetics for the improvement of voice and articulation in communication. *Prerequisite:* sophomore standing. Three hours. I, II. Miss Luse.

111 ADVANCED PUBLIC SPEAKING: EMOTIVE MEANS OF PERSUASION Human motivation, attitudes, emotion, stereotypes, attention, and audience psychology as applied in the speaking situation. *Prerequisite:* 11. Three hours. Mr. Huber and Staff.

112 ADVANCED PUBLIC SPEAKING: LOGICAL MEANS OF PERSUASION Inductive, deductive, causal, and analogical reasoning as applied in the speaking situation. *Prerequisite:* 11. Three hours. Mr. Huber and Staff.

113 ADVANCED PUBLIC SPEAKING: STYLISTIC ELEMENTS Study of speech style and rhetorical criticism by analysis of great speeches and by writing longer speeches. *Prerequisite:* six hours, including 11. Three hours. Mr. Huber.

121 GENERAL SEMANTICS An analysis of the relationship between language and human behavior. *Prerequisite:* 1. Three hours. Mr. Lewis.

193, 194 COLLEGE HONORS

195, 196 SPECIAL TOPICS

197, 198 READINGS AND RESEARCH

201 THEORIES OF HUMAN COMMUNICATION A behavioral approach to the role of language, meaning, perception, thinking and social context in human communication process. *Prerequisite:* Nine hours of related courses, including 1. Three hours. Mr. Yadav.

210 CLASSICAL ORIGINS OF COMMUNICATION THEORY *Prerequisite:* Nine hours of related courses. Three hours. Mr. Waite.

212 PERSUASIVE COMMUNICATION Selected contemporary approaches to persuasion and the study of recent research contributions. *Prerequisite:* Nine hours, including 111. Three hours. Staff.

213 THEORIES OF SPEECH ANALYSIS Principles of speech criticism applied to speakers, speeches, and speech movements. *Prerequisite:* Nine hours of related courses. Three hours. Mr. Waite.

214 ISSUES IN AMERICAN PUBLIC ADDRESS *Prerequisite:* 213. Three hours. Mr. Waite and Ms. Williams.

215 GROUP COMMUNICATION *Prerequisite:* Nine hours of related courses, including 14. Three hours. May be repeated up to nine credit hours. Mr. Cronin.

223 INTERPERSONAL COMMUNICATION *Prerequisite:* Nine hours of related courses, including 121. Three hours. Mr. Lewis and Mr. Yadav.

225 CROSS-CULTURAL COMMUNICATION A study of cultural factors and cognitive process in cross-cultural communication. *Prerequisite:* Nine hours of related courses. Three hours. Mr. Yadav.

283, 284 SEMINAR *Prerequisite:* Departmental permission. Three hours. Staff.

294 SEMINAR FOR PROSPECTIVE TEACHERS OF COMMUNICATION *Prerequisite:* Twelve hours. Three hours. Mr. London.

Mass Communication

63 SURVEY OF MASS COMMUNICATION The historical development, socio-economic and political impacts of the press, radio, television and film in American society. Three hours. I, II. Mr. Howell and Mr. Yadav.

161 AUDIO PRODUCTION A practicum in the use of audio recording techniques and technology as employed in broadcasting, film and multi-media presentations. *Prerequisite:* 63. Three hours. Mr. Howell.

162 WRITING FOR MASS COMMUNICATION *Prerequisite:* 63. Three hours. Mr. Worden.

164 BASIC TELEVISION PRODUCTION *Prerequisite:* 161. Three hours. Mr. Dilley.

165, 166 DEVELOPMENT OF THE MOTION PICTURE *Prerequisite:* junior standing, 165 for 166. Three hours. Mr. Manchel.

167 BASIC FILMMAKING Theories of film expression. Students produce films. Three hours. Mr. Worden.

260, 261 SEMINAR IN MASS MEDIA An intensive examination of selected areas of study related to mass media. *Prerequisite:* Nine hours of related courses, including 63. Three hours. Staff.

263 INTERNATIONAL MASS COMMUNICATION Mass media systems of other countries. *Prerequisite:* Nine hours of related courses. Three hours. May be repeated up to nine credit hours. Mr. London.

264 ADVANCED TELEVISION PRODUCTION Emphasis on the following types of programs: educational, news, documentary, dramatic and variety. Laboratory use of the ETV studio. *Prerequisite:* 164. Three hours. Mr. Dilley.

265 CINEMATOGRAPHY Advanced study of film expression and production of student films. *Prerequisite:* 167 or permission of the instructor. Three hours. Mr. Worden.

266 SEMINAR IN FILM *Prerequisite:* Six hours of related courses, including 165 or 166. Three hours. May be repeated up to nine credit hours. Mr. Manchel.

267 THE CONTEMPORARY CINEMA Lectures, screenings, and reports on modern filmmakers, recent trends and new techniques. *Prerequisite:* six hours of related courses, including 165 or 166. Three hours. Mr. Manchel.

268 THE BLACK MAN IN FILM A study of black artists in movies from 1895 to the present, with an emphasis on American films. *Prerequisite:* six hours of related courses, including 165 or 166. Three hours. Mr. Manchel.

269 BROADCAST NEWS A study of radio and TV news in the United States in terms of its historical, political, social, and economic roles. *Prerequisite:* six hours of related courses, including 63. Three hours. Mr. Howell.

Speech Pathology—Audiology

74 COMMUNICATION (SPEECH AND HEARING) SCIENCE A beginning course for intending majors. Three hours. Mrs. Wilson and Staff.

76 INTRODUCTION TO COMMUNICATION PROBLEMS (SPEECH PATHOLOGY) A general survey course of the problems of communication behavior (speech pathology-audiology). Three hours. Staff. (74 is required of majors.)

101 PHONETICS Acoustic and physiologic phonetics. Analysis of English speech sounds used in the International Phonetic Alphabet. *Prerequisite:* sophomore standing. Three hours. Miss Luse and Mr. Lyon.

270 LEARNING AND DEVELOPMENT OF SPEECH AND LANGUAGE Speech and language acquisition in relation to current learning theory and methods of linguistic analysis. *Prerequisite:* nine hours of speech and psychology, including 74. Three hours. Mrs. Wilson.

271 COMMUNICATION DISORDERS I The etiology, symptomology and principles of habilitation for articulation deviancies, language and fluence disorders. *Prerequisite:* 74, 101 and 270. Three hours. Staff.

272 COMMUNICATION DISORDERS II Problems of voice, cleft palate, cerebral palsy and aphasia. *Prerequisite:* 281. Three hours. Staff.

273 PRINCIPLES OF AUDIOLOGY An introduction to clinical audiology including a consideration of hearing disorders, tests of the hearing function, and hearing conservation programs. *Prerequisite:* Twelve hours of speech and psychology, including 74. Three hours. Mrs. Houghton.

275, 276 CLINICAL STUDY Supervised practicum experiences with children and adults presenting disorders of speech, hearing, and language. *Prerequisite:* Twelve hours in speech and hearing science courses, including 271 or 272; departmental permission. Credit as arranged. Staff.

278 NEUROLOGICAL BASES OF COMMUNICATION Study of the neurological bases of communication and various behavioral correlates; structure and junction of sensory-motor systems and higher centers. *Prerequisite:* nine hours of speech and psychology, including 74. Three hours. Mr. Lyon.

279 THE PREPARATION, MANAGEMENT AND ASSESSMENT OF SYSTEMATIC SPEECH AND LANGUAGE THERAPY Principles of behavioral analysis as applied to disorders of communication. *Prerequisite:* 271 or 272. Three hours. Mr. Toomey.

281 ANATOMY-PHYSIOLOGY OF SPEECH *Prerequisite:* nine hours of speech and psychology, including 74. Three hours. Mr. Lyon.

282 ANATOMY-PHYSIOLOGY OF AUDITION *Prerequisite:* nine hours of speech and psychology including 74. Three hours. Mr. Patterson.

287 CURRENT RESEARCH IN LANGUAGE ACQUISITION Recent advances in the study of child language. *Prerequisite:* 270. Three hours. Mrs. Wilson.

Theatre

39 INTRODUCTION TO THEATRE Three hours. I, II. Messrs. Bryan and Feidner.

41 ACTING *Prerequisite:* 39; sophomore standing. Three hours. I, II. Staff.

42 ACTING *Prerequisite:* 39 and 41 for 42. Three hours. 42 may be repeated up to 9 credit hours. Staff.

142 PLAY DIRECTING *Prerequisite:* six hours, including 39. Three hours. Mr. Feidner.

151 STAGECRAFT Scenic elements of play production; analysis of theatre forms, study and application of basic elements of scenery construction. *Prerequisite:* 39. Three hours. Mr. Schenk.

154 **BASIC SCENE DESIGN** Fundamental principles of scenic design, history and practice. *Prerequisite:* 39. Three hours. Mr. Schenk.

245 **THE CLASSICAL THEATRE** Earliest dramatic rituals and the theatres of Greece and Rome as evidenced by historical remains and extant dramas. *Prerequisite:* 39 plus three hours. Three hours. Mr. Bryan. Alternate years, 1974-75.

246 **THE MEDIEVAL AND RENAISSANCE THEATRE** Medieval and renaissance theatre, accompanied by an evaluation of relevant historical materials and representative dramas. *Prerequisite:* 39 plus three hours. Three hours. Mr. Bryan. Alternate years, 1974-75.

247 **SEVENTEENTH AND EIGHTEENTH CENTURY THEATRE** Dramas and theatrical conditions in Europe and America from the closing of the English theatres to the end of the eighteenth century. *Prerequisite:* 39 plus three hours. Three hours. Mr. Bryan. Alternate years, 1975-76.

248 **NINETEENTH AND TWENTIETH CENTURY THEATRE** Backgrounds, theatrical conventions, and dramas representative of Romanticism, Realism, and revolts against Realism. *Prerequisite:* 39 plus three hours. Three hours. Mr. Bryan. Alternate years, 1975-76.

252 **LIGHTING** Theory and practice in the illumination of stage productions and the creation of aesthetic effects. *Prerequisite:* 151. Three hours. Mr. Schenk.

254 **ADVANCED SCENE DESIGN** Analysis of the drama from the standpoint of its visual creation upon the stage; audience-stage relationships, styles of production. *Prerequisite:* 154. Three hours. Mr. Schenk.

Dental Hygiene

SCHOOL OF ALLIED HEALTH SCIENCES

Assistant Professor Hill (Chairperson); Associate Professors Faigel, Farnham; Assistant Professors Brown, Ingalls, Levi, Montgomery, Wootton; Instructors Bowen, Brigada, Emery, Fersing, Grundler, Josselyn, Joy, Lamoray, Mercier, Preston and Reed.

1 **DENTAL HYGIENE** Study of the theories and the practice of dental hygiene with emphasis on patient education and preventive procedures. Two hours. Staff.

2 **DENTAL HYGIENE** Continuation of Dental Hygiene 1 including special patient care and clinical practice of dental hygiene procedures. Three hours. Staff.

11 **ORAL TISSUES** The study of the morphology and physiology of oral tissues both microscopically and macroscopically. The identification of individual tooth forms. Three hours. Ms. Ingalls.

12 **ORAL TISSUES** The study of the functions of the oral tissues, head and neck anatomy, occlusion, mastication, comminution, and deglutition. Two hours. *Prerequisite:* Oral Tissues 11. Ms. Ingalls.

52 **PHARMACOLOGY AND ANESTHESIOLOGY** The reactions and uses of drugs. Anesthesia, general and local, as used in dental practice. One hour. Dr. MacLellan.

53-54 **ORAL PATHOLOGY** General pathology of the more common disease affecting the human body. Pathology of the teeth and their supporting structures. Two hours. Dr. Farnham.

55 **PERIODONTOLOGY** Classification of periodontal disease, clinical picture, etiological factors, and types of treatment. Two hours. *Prerequisite:* Oral Tissues 11 and 12. Drs. Hill and Levi.

61 **RADIOLOGY** Study, demonstration, and practice of fundamentals of intra-oral radiographic technic including electrophysics; angulation of the machine; placement and complete processing of films. Two hours. Ms. Brown.

62 **DENTAL PRACTICE** Discussion and project participation in the planning, development, and implementation of dental health education, public health dentistry, and the private practice of dentistry. Three hours. Dr. Montgomery.

81-82 **CLINICAL DENTAL HYGIENE** Clinical practice with patients from simple to more difficult cases both children and adults. Field practice at local dental clinics, hospitals, and private institutions. Four hours. *Prerequisite:* Dental Hygiene 1 and 2.

91 **DENTAL MATERIALS** Study of the materials used routinely in dental practice. One hour. Dr. Fersing, Ms. Lamoray.

Economics

COLLEGE OF ARTS AND SCIENCES

Professors Alnasrawi, Campagna (Chairman), Dellin and Nadworny; Associate Professor Chase; Assistant Professor Bates; Instructors Fritz and Versteeg.

3 **CURRENT ECONOMIC PROBLEMS** Designed primarily for non-majors to deal with some of the current issues and problems which face contemporary economies. Each section stresses usually different problems, according to the discretion and specialization of the instructor. Three hours. Staff.

11, 12 **PRINCIPLES OF ECONOMICS** Economics 11 presents an analysis of the business firm, price formation under competitive and monopolistic conditions, and the role of factors of production in the distribution of income. Economics 12 emphasizes national income analysis and the role of government fiscal and monetary policy as it affects employment stability and growth. 11 and 12 which can be taken in any order, are usually prerequisites for all courses numbered 100 and above. Three hours. Staff.

15, 16 **ECONOMIC HISTORY OF THE UNITED STATES** Three hours. Mr. Nadworny.

101 **MONEY AND BANKING** Commerical and central banking with special attention given to the Federal Reserve System, monetary theory and policy. *Prerequisite:* 12. Three hours. Messrs. Alnasrawi and Wicker.

103 **PUBLIC FINANCE** Revenues and expenditures of federal, state and local governments and intergovernmental relationships; the effects of expenditures and taxation upon individuals, business institutions, and the national economy. *Prerequisite:* 11 and 12. Three hours. Mr. Campagna.

105 **INTERNATIONAL TRADE AND FINANCE** Theories of international values, adjustment of international balances, foreign exchange, international aspects of money and banking, and tariffs. *Prerequisite:* 11, 12. Three hours. Mr. Alnasrawi.

141 **LABOR ECONOMICS** Labor as an economic factor: the labor force, wages, productivity, and income. Wage and hour legislation, social security, and unemployment insurance. *Prerequisite:* 11, 12. Three hours. Messrs. Nadworny and Chase.

142 **COLLECTIVE BARGAINING** Issues and practices in labor-management relationships. Collective bargaining impacts on the economy. The grievance process, arbitration, and labor relations laws. *Prerequisite:* 141. Three hours. Mr. Nadworny.

186 **MICROECONOMIC THEORY** Analysis of consumer demand, supply, market price under competitive conditions and monopolistic influences, and the theory of income distribution. *Prerequisite:* 11, 12. Three hours. Staff.

188 **ECONOMIC STATISTICS** Elementary statistical theory as applied to economic data and projections. *Prerequisites:* 11, 12. Three hours. Fritz.

190 **MACROECONOMIC THEORY** Keynesian and post-Keynesian theories of economic development; government policies in relation to the problems of employment, stability and growth in developed economies. *Prerequisite:* 11, 12. Three hours. Mr. Campagna.

193, 194 **COLLEGE HONORS**

195, 196 **SPECIAL TOPICS**

197, 198 **READINGS AND RESEARCH**

216 **ECONOMIC DEVELOPMENT** Theories of economic growth applied to underdeveloped areas of the contemporary world, including the political and social determinants of economic progress. *Prerequisite:* 11, 12, 190 recommended. Three hours. Mr. Alnasrawi.

217 **REGIONAL ECONOMIC GROWTH** Theoretical models of regional growth; relationships among growth theory, international trade theory, and location theory. Interregional factor movements related to historical patterns of income growth at the state level in the U.S. *Prerequisites:* 186, 190. Three hours. Mr. Fritz.

234 **MONETARY THEORY** Analysis of Classical, Keynesian, and modern macroeconomic models; micro and macro demand for and supply of money; portfolio choice; term structure of interest rates and the influence of financial intermediaries. *Prerequisite:* 190. Three hours. Mr. Bates.

238 **ECONOMIC HISTORY OF MODERN EUROPE** A comparative historical study of the process of economic growth as experienced in Britain, France, Germany, and Russia since 1760. For the economic history of pre-industrial Europe see history 237. *Prerequisite:* 11, 12 and history 12. Three hours. Mr. Chase.

240 **WAGE AND EMPLOYMENT THEORY** Microeconomic analysis of the pricing of labor. Theoretical economic and behavioral models of the role and effects of institutions on the wages, allocations, and levels of utilization of labor resources. *Prerequisites:* 186, 190; 141 highly desirable. Three hours. Mr. Chase.

241 **MANPOWER IN AN ADVANCED ECONOMY** Fundamental changes in the structure of the American labor force; income, education, occupational distribution, and unemployment factors. Implications and impacts of governmental and

private sector programs on manpower training and allocation. Income maintenance and manpower. *Prerequisite:* 141. Three hours. Messrs. Chase and Nadworny.

256 AMERICAN BUSINESS AND ECONOMIC HISTORY Evolution of firms and industries in U.S. economy. The roles of federal and state governments and of legislation. Development of American management. *Prerequisite:* 143. Three hours. Mr. Nadworny.

258 PROBLEMS OF COMMUNISM (same as political science 258) A comparative study of economic and political problems of applied communism with particular emphasis on current developments in selected Communist countries. *Prerequisite:* Twelve hours in history and/or social sciences. Three hours. Mr. Dellin.

267 INTRODUCTION TO ECONOMETRICS A combination of economic theory, mathematics, and statistics for the testing of economic hypotheses and developing economic models. *Prerequisites:* 186, 188, and 190. Three hours. Fritz.

285 COMPARATIVE ECONOMIC SYSTEMS Major economic systems of mixed capitalist and socialist variety, their theoretical models, basic institutions and policies from a comparative point of view. *Prerequisite:* 11, 12 and six hours in another social science. Three hours. Mr. Dellin.

290 THE SOVIET ECONOMY Analysis of the economic development, structure, performance and direction of the Soviet Union. Seminar. *Prerequisite:* 11, 12 and six hours in another social science. Three hours. Mr. Dellin.

291 ECONOMIC PATTERNS AND POLICIES OF EASTERN EUROPE An area approach to the resources, organization, and domestic and foreign policies of the Communist countries of Eastern Europe, with special emphasis on recent changes. *Prerequisite:* 12 and six hours in another social science. Three hours. Mr. Dellin.

292 INTERNATIONAL ECONOMIC PROBLEMS AND POLICIES Important aspects of international cooperation and conflict in the economic sphere; quest for foreign markets, raw materials, investment opportunities, and population outlets, as well as East-West trade. *Prerequisite:* 11, 12. Three hours. Messrs. Alnasrawi and Dellin.

293 WEST EUROPEAN ECONOMIES A study of the evolution of the economic systems of West European countries, with particular emphasis on the Common Market and its foreign Economic relations. *Prerequisite:* 11, 12 and six hours in another social science. Mr. Dellin.

295 DEVELOPMENT OF ECONOMIC THOUGHT Development of economic ideas. The Pre-Classical, Classical, Socialist, Neo-Classical, Keynesian Schools and individual theoreticians. *Prerequisite:* 186 and 190 or concurrent enrollment. Three hours. Messrs. Dellin and Chase.

297, 298 SEMINAR For students concentrating in the department. Review of recent books and periodic literature; discussions of topics of contemporary interest; student reports based upon personal investigation. *Prerequisite:* senior standing; departmental permission. Three hours. Staff.

V Education

COLLEGE OF EDUCATION AND SOCIAL SERVICES

*Professors Boller, Corrigan, Fishell, Gobin, Hunt, Leggett, McKenzie, Peterson, Petrusich, Rippa; Associate Professors Abruscato, Agne, Carlson, Case, Christensen, Clements, Conrad, Ducharme, Fox, Hanley, Hillman, Lang, Larson, Nash, Nichols, Rathbone, Saurman, Stocker, Thompson, Whittlesey; Assistant Professors Bright, Burrell, Chase, Cheney, Dunkley, Egner, Erb, Greig, Guerette, Knight, Kusiak, LaCasse, Lange, Letteri, Marchant, McEntee, McKay, Meyers, Nedde, Perelman, Ponzo, Shiman, Soderberg, Strassburg, Szabo, H., Szabo, R.; Instructors Burdett, Christie, Donoghue, Graves, Gryckiewicz, Lates, Miller, Pao-
lucci, Pierson, Roberts, Royce, Schiller, Slack, Smith, Watson; Physical Education Specialists Condon, Farrell, Hayes, Reinhardt.*

EDSS—Education—General

1 **SCHOOLING, LEARNING, AND SOCIETY** An introduction to issues and problems in American education: schools and learning, professional careers, individuals in systems, characteristics of learners. Required readings and papers. Non-CESS students only. 3 credits. Staff.

2 **FOUNDATIONS OF EDUCATION** Social foundations of education: development of American education; education as a profession. Three hours. I or II. Staff.

55 **SPECIAL TOPICS** Designed so that its content and structure may accommodate special issues in education not especially appropriate within the boundaries of an existing course. Two to six hours. Staff.

142 **AUDIO-VISUAL MATERIALS AND METHODS** Designed to increase teacher capabilities in the use of instructional media and in the integration of media into the classroom and curriculum. Emphasis will be given to technology as it relates to individualizing instruction and to meeting the needs of learners in various kinds of groups. Activities will be directed to preparation of materials and the collation of sources of media used in elementary education. Laboratory time will be provided in the course structure. Three hours. Staff.

143, 144 **Studies in behavior with emphasis in cognitive, emotional, and psychological development.** Examination of views of learning styles and development processes. Non-CESS only. Three hours. Messrs: Hanley and Letteri.

145, 146 **LEARNING AND HUMAN DEVELOPMENT** The developing individual; psychology of learning with particular application to human development; measurement and evaluation of learning and development; opportunities for related field experiences. Three hours. Staff.

147, 148 **LEARNING, PERSONALITY, AND CHANGE** Understanding of major psychological models of man and theories of learning. Integration of the theory and practice of particular systems of human development and human learning. Analysis of selected social problems and institutional settings. Problems related to educational/social service institutions, with the focus on the role of the helping professions in the learning and change process. (9 credits: 6 in Fall Semester; 3 in Spring Semester). Staff.

190 **APPROACHES TO EDUCATION** Senior Interdisciplinary Seminar A study of ideas and values, historic and contemporary, with emphasis upon the ideological bases of American education. Drawing from theory and research in the humanities and social sciences, this course helps the student to develop new perspectives as a guide toward resolving some of the crucial issues of our time. *Prerequisite:* senior standing. Three hours. Messrs: Conrad, Ducharme, Nash, Rippa, and Shiman.

197 **READINGS AND RESEARCH** Individual research problem or directed reading in an area of special interest to the student. *Prerequisite:* permission of the instructor. Variable credit, one to four hours per semester. Course may be repeated for a maximum of eight hours credit. Ms. Boller.

198 **PERSONAL COMPONENT** The personal component offers students an opportunity to pursue an activity under self-direction. Each student is required to state the objectives for his study and make a contractual arrangement with his personal component adviser to fulfill the terms of the contract. Each contract holds one credit. Options such as education colloquia, community action experience, seminars and discussion groups, individual counseling, group counseling, and others will be provided during the four years. The course may be repeated for a maximum of seven hours credit. Only open to UVM students enrolled in Teacher Education and Social Welfare Programs. Mr. Gryckiewicz and Staff.

202 **PHILOSOPHY OF EDUCATION** Educational theory and philosophy past and present; contributions of leading educational philosophers; the interrelations of education, society, and philosophy. *Prerequisite:* 12 hours in education and related areas. Three hours. Ms. Boller, Mr. Nash, or Mr. Rippa.

204 **SEMINAR IN EDUCATIONAL HISTORY: The Struggle for Equality of Opportunity** A study of selected topics in the history of education from the "Golden Age" of Greece to the present. Special attention to the nature of education in democratic and authoritarian social orders. Discussions and research will revolve around such topics as the education of women, the plight of American Indians, and the quest of the black people throughout the world for equality and freedom. *Prerequisites:* 12 hours in education and related areas, or permission of instructor. Three hours. Mr. Rippa.

205 **HISTORY OF AMERICAN EDUCATION** History of principles and practices in American education as they relate to social, economic, political, and cultural developments. Discussions will focus on key ideas of historic and contemporary significance. *Prerequisite:* 12 hours in education and related areas, or permission of instructor. Three hours. Mr. Rippa.

206 **COMPARATIVE EDUCATION** An examination of educational policies and practices in selected countries throughout the world. Special attention will be paid to those topics that relate to important issues in American education. *Prerequisite:* 12 hours in education and related areas. Three hours. Mr. Shiman.

211 **EDUCATIONAL MEASUREMENTS** The essential principles of measurement in education. Topics include measures of achievement, analysis of standard tests, construction of objective tests and inventories. *Prerequisite:* 12 hours in education and related areas. Three hours. Staff.

212 **CHILD AND ADOLESCENT DEVELOPMENT** A study of the growth and development of the individual from infancy to adulthood with special emphasis

upon implications for teaching and learning. *Prerequisite:* 12 hours in education and related areas. Three hours. Staff.

248 **EDUCATIONAL MEDIA** Modern instructional aids, theory and practice, educational media related to psychology of teaching and learning. *Prerequisite:* twelve hours in education and related areas. Three hours. Staff.

252 **SEMINAR IN AESTHETIC EDUCATION** A critical examination of aesthetic values transmitted in contemporary schools. Consideration of ways to expand aesthetic awareness among children, youth and adults. The aesthetic quality of natural and man-made environments with implications for present and future educational practice will be given special attention. *Prerequisite:* 12 hours in education and related areas. Three hours. Mr. Conrad.

254 **ANTHROPOLOGY OF EDUCATION** Introductory examination of theories and research of cultural anthropology and education. An anthropological perspective on education grounded in the cultural realities of life in the American school. Study of the interrelationship of culture and man—his educational values, beliefs, and practices. *Prerequisite:* 12 hours in education and related areas. Three hours. Mr. Nash.

255 **THE SCHOOL AS A SOCIAL INSTITUTION** Professional role of the modern educator and the values underlying educational policy will focus on such contemporary issues as political pressures on public schools, problems of integration, place of religion in education, and impact of the culturally different child on school and community. *Prerequisite:* 12 hours in education and related areas. Three hours. Ms. Boller, Mr. Conrad, Mr. Nash, or Mr. Ripa.

292 **ISSUES IN CONTEMPORARY EDUCATION** Designed so that its content and structure may accommodate special issues in education not especially appropriate within the boundaries of an existing course. *Prerequisite:* 12 hours in Education and related areas. Two to six hours. Staff.

295, 296, 297, 298 **LABORATORY EXPERIENCE IN EDUCATION** Supervised field work designed to give student experience in specialized areas for their professional development. *Prerequisite:* permission of the Coordinator of Professional Laboratory Experiences. Credit as arranged. Mr. Meyers and Staff.

EDAR—Art Education

140 **ENCOUNTER WITH ART I** Purpose and methods in contemporary Art Education Studio Workshops, discussions, lectures, and some field work in creative art activities. Course designed for elementary education majors. Three hours. Staff.

141 **ENCOUNTER WITH ART II** Purpose and methods in contemporary Art Education. Student required to work as studio intern for six hours per week. Evolution and discussion of the various teaching procedures used. Information dealt with will be common to secondary level. *Prerequisite:* Junior standing. Four hours. Staff.

177 **CURRICULUM AND PRACTICE IN ELEMENTARY AND SECONDARY ART EDUCATION** The study and implementation of curriculum development in elementary and secondary Art Education. Students will plan and teach art classes at the Art Education Center. *Prerequisite:* permission of instructor. Three hours. Staff.

183 SEMINAR: CURRENT ISSUES IN ART EDUCATION Research and discussion of issues relevant to contemporary art education. *Prerequisite:* permission of instructor. Three hours. Staff.

184 SPECIAL PROBLEMS IN ART EDUCATION Individual investigation of a selected problem in Art Education under the supervision of staff. Reports and group discussions. *Prerequisite:* Junior standing or permission of instructor. Three hours. Staff.

292 ISSUES IN CONTEMPORARY EDUCATION Designed so that its content and structure may accommodate special issues in education not especially appropriate within the boundaries of an existing course. *Prerequisite:* 12 hours in Education and related areas. Two to six hours. Staff.

EDEL—Education—Elementary

3, 4 CHILD AND COMMUNITY Supervised experiences with children's groups in the community. Students should plan a schedule which will enable them to have blocks of time, such as a morning or afternoon, free of regular classes. *Prerequisite:* sophomore standing. One hour. Ms. Bollér and Staff.

121 READING AND LANGUAGE ARTS Principles underlying teaching reading; materials of instruction; reading readiness; vocabulary development; development of correct study skills; reading in the Language Arts program; observation in elementary school. Three hours. Mrs. Lang, Mrs. Stocker and Mr. Clements.

122 DEVELOPMENTAL READING Consideration of current practices and controversial issues relative to teaching reading. Study of recent innovations, methods, materials, as well as the organization and evaluation of various reading programs. *Prerequisite:* for Elementary Education Majors, 121; all others consent of Director of Reading Center. Three hours. Staff.

134 CHILDREN'S LITERATURE AND LANGUAGE ARTS Traditional and modern children's literature in prose and poetry; appreciation and evaluation of literature for children of all age levels; techniques of story telling; literature in the Language Arts program. Three hours. Mrs. Lang, Mrs. Stocker, Mr. Clements.

144 TEACHING SCIENCE AND SOCIAL STUDIES Teaching methods, curriculum planning in social studies and science for the primary through middle school. A variety of nationally developed curriculum projects will be examined and micro-taught; AAAS Science: A Process Approach, Elementary Science Study, Science Curriculum Improvement Study, Conceptually Oriented Program in Elementary Science, Environmental Studies, Taba Social Studies, Man: A Course of Study. A wide variety of instructional activities and strategies will be considered. Three hours. Mr. Agne and Ms. Petrusich.

160 TEACHING MATHEMATICS AND CRITICAL THINKING IN THE ELEMENTARY SCHOOL An investigation of the modern approach to mathematics with emphasis on instructional strategies, curriculum resources, and problem solving. Students will construct learning aids, develop individualized learning units, and have opportunity to use various manipulative devices. Three hours. Mr. Agne and Mr. Erb.

181 STUDENT TEACHING See course description under Secondary Education, page 199.

222 IMPROVEMENT OF READING INSTRUCTION IN THE ELEMENTARY SCHOOL Analysis of philosophies, programs and instructional practices for teaching reading in the elementary school. Examination and evaluation of basal textbook, individual and specialized reading programs. *Prerequisite:* twelve hours in education and or related areas including an introductory course in reading or consent of instructor. Three hours. Staff.

234 LITERATURE AND LANGUAGE FOR CHILDREN AND YOUTH Characteristics, interests, and reading habits of children and young people; criteria for selection and evaluation of literature; organizing book units for teaching literature and for content areas; books for children and youth. *Prerequisite:* 12 hours in education and related areas or consent of instructor. Three hours. Mrs. Lang.

242 MODERN TRENDS IN ELEMENTARY EDUCATION Study of modern educational principles and practices in today's elementary schools. Emphasis will be on communication in the classroom, interaction between students and teachers, materials and emerging trends as they affect the elementary school. The course will deal with different teaching modes that may assist in the development of more critical analysis of the teaching act. *Prerequisite:* 12 hours in education and related areas. Three hours. Mr. McEntee and Ms. Petrusich.

275 INTRODUCTION TO ANALYSIS OF READING AND RELATED DIFFICULTIES Analysis and evaluation of learning difficulties with emphasis on reading and writing; nature of difficulties; procedures and materials for assessing reading performance. Involvement with children is required. *Prerequisite:* Six hours in reading and three hours in Education or permission of instructor. Three hours. Mr. Clements.

276 INTRODUCTION TO LABORATORY EXPERIENCES IN READING AND RELATED LANGUAGE INSTRUCTION Approaches to be used for the prevention and correction of reading and written language difficulties. Supervised teaching of individuals and/or small groups experiencing reading and language problems. Apprenticeships in reading instructional programs. *Prerequisite:* Introduction to Analysis of Reading and Related Language Difficulties. Three to six hours. Mr. Clements.

292 ISSUES IN CONTEMPORARY EDUCATION Designed so that its content and structure may accommodate special issues in education not especially appropriate within the boundaries of an existing course. *Prerequisite:* 12 hours in Education and related areas. Two to six hours. Staff.

EDSP-Special Education

216 INTRODUCTION TO INDIVIDUALIZED INSTRUCTION FOR CLASSROOM TEACHERS Introduction to the individualization of instruction for language behaviors, including the analysis, measurement and evaluation of reading, spelling and written and oral communication. Each student is required to complete a classroom project with an elementary school child. *Prerequisite:* 12 hours in education and related areas and permission of the instructor. Juniors and seniors. Three hours. Staff.

220 PERSONALITY DEVELOPMENT Approaches to understanding human behavior in applied settings. With emphasis on behavior development as an interpersonal process. *Prerequisite:* 12 hours in education and psychology. Three hours. Mr. Peterson.

224 **INTRODUCTION TO BEHAVIORAL PRINCIPLES OF EDUCATION** This course will involve an analysis of specific teachers' and childrens' behavior in the classroom setting that function to either facilitate or impede the attainment of educational goals. Emphasis will be on the application of basic behavioral principles in the regular class setting that will improve student's academic and social behaviors. *Prerequisite:* 12 hours in Education and related areas and permission of the instructor. Juniors and Seniors. Three hours. Staff.

292 **ISSUES IN CONTEMPORARY EDUCATION** Designed so that its content and structure may accommodate special issues in education not especially appropriate within the boundaries of an existing course. *Prerequisite:* 12 hours in Education and related areas. Two to six hours. Staff.

295, 296, 297, 298 **LABORATORY EXPERIENCE IN EDUCATION** Supervised field work designed to give student experience in specialized areas for their professional development. *Prerequisite:* permission of the Coordinator of Professional Laboratory Experiences. Credit as arranged. Staff.

EDMU-Music Education

111 **MUSIC FOR ELEMENTARY TEACHERS** The development of musical skills, understandings, and attitudes pertinent to the teaching of music in the elementary classroom. *Prerequisite:* Sophomore standing. Three hours. Mr. Wigness.

112 **ELEMENTARY MUSIC METHODS** A course to aid the elementary classroom teacher in developing the potential musicality of students to the highest level through the practical application of musical skills and understandings already acquired by the teacher. *Prerequisite:* 111. Three hours. Mr. Wigness.

131 **MUSIC METHODS** Methods and materials in the teaching of vocal and instrumental music in elementary and secondary schools. *Prerequisite:* 145, 146 and senior standing in music education. Five hours. Mr. Schultz.

295, 296, 297, 298 **LABORATORY EXPERIENCE IN EDUCATION** Supervised field work designed to give student experience in specialized areas for their professional development. *Prerequisite:* permission of the Coordinator of Professional Laboratory Experiences. Credit as arranged. Staff.

EDPE-Physical Education Professional

21 **FOUNDATIONS OF PHYSICAL EDUCATION** Review of Historical, Philosophical and Scientific Foundations as a basis for physical education and an introduction to the scope and rule of school physical education and to the opportunities and obligations associated with physical education as a profession. Three hours. Mr. Christensen & Mr. Soderberg.

22 **FIRST AID AND SAFETY EDUCATION** First aid knowledge and skill required to respond to common emergency situations. Content includes treatment for wounds, burns, shock, broken bones, internal poisoning, as well as techniques for bandaging, artificial respiration, and transportation. Red Cross certification as First Aid Instructor for successful performance. Two hours. Staff.

26 **WATER SAFETY** Advance performance skills in swimming, diving, survival and rescue techniques. Theory and practice in the techniques of teaching aquatic skills. Red Cross certification as Water Safety Instructor or Instructor for Beginning Swimming. *Prerequisite:* current Red Cross Lifesaving Certificate. Two hours. Ms. Farrell, Mr. Szabo.

50 **INTRODUCTION TO DANCE** A survey of various aspects of dance. Background in the historical and educational basis of dance. Opportunity to explore ethnic forms, performance, technique, choreography and/or other areas of interest. *Prerequisite:* skill, competency and permission of instructor. Three hours. Ms. Hayes. Alternate years 1974-75, 1976-77.

52 **DEVELOPMENT OF MOTOR SKILLS** Orientation to an understanding of the basic motor skills which form the foundation for all active planning in the physical education program. Two hours. Mr. Dunkley, Ms. Nichols.

100 **TEACHING PHYSICAL EDUCATION IN THE ELEMENTARY SCHOOL** Planning, organization and practice in skills appropriate for teaching movement patterns to children aged 4-12. Three hours (two hours, elementary education majors only). Mr. Dunkley, Ms. Nichols.

104, 105 **PHYSICAL EDUCATION TEACHING EXPERIENCE (PETEX)** An experience based course sequence emphasizing the relationship of motor development to learning. Includes age level needs and appropriate physical education activity sequences. Screening and response to perceptual mechanisms and implications for teaching motor skills. The first semester focuses on grades K-3. The second semester (105) studies the needs and programs appropriate for youngsters in grades 4-6. Five hours. Ms. Nichols, Mr. Dunkley.

116 **HEALTH EDUCATION** Concepts of personal health related to problems of daily living. Areas of concern include mental health, sex education, nutrition and weight control, fatigue and relaxation, chronic and communicable disease, stimulants and depressants. Three hours. (Two hours for elementary education majors only.) Mrs. Slack, Mr. Gobin.

123 **COACHING BASEBALL AND FOOTBALL** Theory and technique of coaching interscholastic baseball and football. Includes practice, game and schedule organizations. *Prerequisite:* skill competency in baseball and football, and junior standing. Three hours. Mr. Falivene and Staff.

124 **COACHING TRACK AND WRESTLING** Analysis and practice of the skills, technique and knowledge involved in coaching interscholastic track and wrestling. *Prerequisite:* skill competency in track and wrestling and junior standing. Three hours. Mr. Nedde. Alternate years 1974-75, 1976-77.

125 **COACHING SOCCER AND BASKETBALL** Theory and technique of coaching interscholastic soccer and basketball. Includes practice game and schedule organization. *Prerequisite:* Skill competency in soccer and basketball, and junior standing. Three hours. Mr. Soderberg and Mr. Salzberg.

126 **COACHING GYMNASTICS AND AQUATICS** Analysis and practice of skills, techniques and knowledge involved in teaching and coaching gymnastics and aquatics. *Prerequisites:* Skill competency in gymnastics and aquatics, and junior standing. Three hours. Mr. Dunkley and Staff. Alternate years 1975-76, 1977-78.

140 **SEMINAR IN PHYSICAL EDUCATION** Strategy, analysis, techniques and contemporary issues in selected areas of physical education. Variable credit based upon the nature of the semester topic selection. One-three credits. Staff.

145 **SEMINAR IN ATHLETICS** Contemporary issues, strategy, analysis and problem areas related to selected comparative sports. Variable credit. One-three credits. Staff.

150 SEMINAR IN HEALTH EDUCATION In-depth content, methods, materials and units of instruction for selected areas of health education. Special emphasis upon current health problems. Variable credit, one-three. Staff.

154 INTRODUCTION TO RECREATION Development of the recreation movement, its culture, social and economic background in American society. Techniques of leadership, community resources, supervision and evaluation methods in community recreation programs. The organization and objectives of recreation programs in various types of communities with emphasis upon the tax supported programs. Staff.

155 PHYSICAL EDUCATION IN THE SECONDARY SCHOOL Theories of teaching which include unit plan development, classification and grouping of students for instruction, and a variety of teaching methods including the use of a problem solving approach to learning. Laboratory experience in teaching activity skills to youths from age of 12-18 years. *Prerequisite:* junior standing. Three credits. Mr. Gobin.

156 THE PHYSICAL EDUCATION CURRICULUM The role of physical education in the comprehensive school curriculum. Philosophy and techniques of curriculum innovation. Emphasis upon inter-relationships that exist between student needs and interests, teaching methodology, evaluative procedures, community involvement and administrative organizational patterns. *Prerequisite:* PE 100 or 155. Three hours. Mr. Gobin.

157 CARE AND PREVENTION OF ATHLETIC INJURIES Prevention, recognition and care of injuries related to school physical education and athletic programs. Two hours. Mr. Bryant.

158 ORGANIZATION AND ADMINISTRATION OF PHYSICAL EDUCATION Organization and administration of instructional programs, intramurals, inter-scholastic athletics, school recreational programs, schedules, personnel, budgets, equipment, records, tests, and public relations. Three hours. Mr. Christensen.

166. KINESIOLOGY Study of joint articulation, muscular action, and basic principles of body mechanics as a foundation for the analysis of motor performance in physical education activities, athletics, and physical therapy. *Prerequisite:* One year Biol. Sci. Three hours. Mr. Leggett or Mr. Kusiak.

167 PHYSIOLOGY OF MUSCULAR ACTIVITY Study of physical exercise upon the circulatory, respiratory, digestive, and nervous system. Relationship of endurance, fatigue, training and nutrition to the efficiency of physical performance. *Prerequisite:* one year Bio. Sci. Three hours. Mr. Leggett or Ms. Lange.

168 TESTS AND MEASUREMENTS IN PHYSICAL EDUCATION Principles and techniques in evaluation of instruction in health and physical education. Emphasis is given to test selection, administration, construction, application of statistical procedures, and development and interpretation of research data. Three hours. Accelerated. Mr. Greig or Mr. Kusiak.

169 HISTORY AND PRINCIPLES OF PHYSICAL EDUCATION The development of physical education; functions of physical education in society; underlying principles and concepts. Three hours. Accelerated. Mr. Gobin or Mr. Greig.

170 PHYSICAL EDUCATION FOR THE ATYPICAL Recognition, prevention, and correction of functional and structure deviations from normal body mechanics. Special emphasis given to the organization of programs adapted to the needs of

physically, emotionally, and mentally handicapped children. *Prerequisite:* P.E. 100 or 155. Three hours. Mr. Gobin.

172 **PSYCHOLOGY OF COACHING** Analysis and application of psychological sub-disciplines to coaching and athletics. Learning, motivation, transfer, retention and emotion are discussed with special implications for the coach. Personality qualities of the player and coach will be examined as they relate to success in sport. An analysis of the outside influences on the athlete as they affect the player-coach relationship. Three hours. Mr. Greig.

173 **PRACTICUM IN FIELD EXPERIENCE** Individually prescribed teaching experience involving work with youth groups in activities related to Physical Education, Health, or Recreation. Responsibilities will approximate those commonly associated with student teaching. *Prerequisite:* PEP 100, 155, or permission of the department. Variable credit (2-4 hours). Staff.

182 **HEALTH METHODS AND MATERIALS** Fundamental methods of health teaching as applied to school and public health education. Consideration of materials applicable to health education, evaluation techniques, preparation of teaching units and bibliographies, a survey of the literature in the field of health education. A laboratory teaching experience will be provided. Three hours. Ms. Slack or Mr. Gobin.

192 **INTRAMURAL PROGRAMS** Organization and administration of intramural sports programs for Junior High through college levels. Philosophy, program planning, units of competition, and financing of intramural programs. Laboratory experience organization, supervision and officiating the UVM Intramural Program. *Prerequisite:* PEP 22 or 157 and junior standing. Three hours. Mr. Strassburg.

195 **RECREATION LEADERSHIP** A practical approach to the significance, theories and characteristics of leadership content and methods of program planning. Field work practice in planning and leadership techniques. Three hours. Staff.

197 **READING AND RESEARCH** For course description see the College of Education and Social Services listing.

201 **ADMINISTRATION AND ATHLETIC PROGRAMS** Designed to provide the athletic director, school administrator, and teacher-coach with a background for effective administration of the athletic program of schools. Area considered include scheduling, budgeting, management, equipment, policy, public relations, and educational justification. *Prerequisite:* 12 hours of education and psychology. Three hours. Mr. Leggett.

203 **PRINCIPLES OF PHYSICAL EDUCATION** Principles basic to sound philosophy of physical education for appraisal of historical development; relationship to health education, recreation and other areas; foundation and functions of physical education in contemporary society. *Prerequisite:* junior standing. Three hours. Mr. Christensen, Mr. Greig.

208 **SCHOOL HEALTH PROGRAMS** Organization of the total school health program. Problems and administration in the area of school environment, health services, health education, and school-community relationship. Special emphasis on health appraisal of children in grades 1 through 12. *Prerequisite:* P.E. 116 (Health Education) or equivalent. Three hours. Ms. Slack or Mr. Gobin.

EDSC-Education-Secondary

15 PARTICIPATION A minimum of thirty clock hours of observation and participation in classroom work in a formal learning environment. Weekly seminars on campus. Students should plan a schedule which will enable them to have blocks of time, such as a morning or afternoon, free of regular classes. *Prerequisite:* sophomore standing and acceptance by the Coordinator of Professional Laboratory Experiences. Two hours. Coordinator of Professional Laboratory Experiences and Staff.

178 SECONDARY METHODS AND PROCEDURES This course is designed to prepare students for teaching in the secondary school. Experiences such as micro-teaching, role playing, classroom simulation, analysis of classroom behavior, and preparation of individualized materials are integral portions of the course. *Prerequisite:* satisfactory completion of Ed. 145 & 146, senior standing, and acceptance in a teacher education program. Three hours. Mr. Roberts.

179 SECONDARY METHODS AND PROCEDURES IN SPECIAL SUBJECT AREAS (Latin, mathematics, romance languages, and social studies.) *Prerequisite:* prior or simultaneous enrollment in Ed. 178 and acceptance in a teacher education program. Variable credit, two or three hours, i.e. Latin 3 hrs., mathematics 3 hrs., romance language 3 hrs. and social studies 3 hrs. (English majors enroll in Ed. Eng. 182 and Speech majors in Ed. Speech 294. Speech minors are encouraged to enroll in 294.) Staff.

181 STUDENT TEACHING Teaching in the elementary or secondary schools under the guidance of cooperating teachers, principals, and college supervisors. For most undergraduates this is a full-time, 16 weeks, 12 credit experience during a semester. *Prerequisite:* acceptance in a teacher education program, and acceptance by the Coordinator of Professional Laboratory Experiences. Variable credit, three to twelve hours. Coordinator of Professional Laboratory Experiences and Staff.

182 SEMINAR FOR PROSPECTIVE TEACHERS OF ENGLISH (see page 217 English 182).

217 SECONDARY SCHOOL CURRICULUM Principles and problems in curriculum development. An analysis of recent curricular innovations in American secondary schools. *Prerequisite:* twelve hours of education and related areas. Three hours. Mr. Abruscato.

223 READING PROGRAMS IN SECONDARY SCHOOLS AND COLLEGES Relationship of reading to learning; study of organization, instructional procedures, and materials for developing reading improvement programs for secondary and college students; reading in content areas. *Prerequisite:* twelve hours in education and/or related areas or consent of instructor. Three hours. Mrs. Lang.

294 SEMINAR FOR PROSPECTIVE TEACHERS OF COMMUNICATIONS (see page 183 C&T 294).

295, 296, 297, 298 LABORATORY EXPERIENCE IN EDUCATION Supervised field work designed to give student experience in specialized areas for their professional development. *Prerequisite:* permission of the Coordinator of Professional Laboratory Experiences. Credit as arranged. Coordinator of Professional Laboratory Experiences and Staff.

EDOH-Education-Organizational and Human Development

185 **FUTURE COGNITION** A survivable future will require the development of expanded cognitive and affective abilities, consensus on values, and new behaviors and skills. Alternative futures will be examined to determine the implications for these abilities and implications for current educational processes. Students will develop scenarios of alternative futures. Three hours. Mr. Case.

220 **PERSONALITY DEVELOPMENT** Approaches to understanding human behavior in applied settings. With emphasis on behavior development as an interpersonal process. *Prerequisite:* 12 hours in education and psychology. Three hours. Mr. Peterson.

292 **ISSUES IN CONTEMPORARY EDUCATION** Designed so that its content and structure may accommodate special issues in education not especially appropriate within the boundaries of an existing course. *Prerequisite:* 12 hours in Education and related areas. Two to six hours. Staff.

295, 296, 297, 298 **LABORATORY EXPERIENCE IN EDUCATION** Supervised field work designed to give student experience in specialized areas for their professional development. *Prerequisite:* permission of the Coordinator of Professional Laboratory Experiences. Credit as arranged. Staff.

SOSE-Social Work and Social Services

2 **FOUNDATIONS OF SOCIAL WORK** An introductory course in Social Work to develop an understanding of existing social service delivery systems and their history. Three hours. Staff.

51 **HUMAN NEEDS AND SOCIAL SERVICES** Study of problems of social functioning and social services to meet such problems. Three hours. Staff.

✓166, 167 **SOCIAL WELFARE AS A SOCIAL INSTITUTION** Philosophy, purpose, history of social welfare; review of fields and processes of social work. *Prerequisites:* Sociology 22, Psychology 1, Economics 3, Political Science 21. Three hours. Staff.

168, 169 **SOCIAL WORK AS A PROFESSION** Means of intervention or methods employed by social workers in providing services on individual, group and community levels. *Prerequisites:* SW 166, 167. Three hours. Staff.

170 **FIELD EXPERIENCE** Field experience under supervision will be given in social agencies four and one-half days each week. Weekly seminar. *Prerequisites:* senior standing; SW 51, 166, 167, 168. Fifteen hours. Staff.

291, 292 **SPECIAL PROBLEM** Supervised study in the field of social welfare. Not for graduate credit. Three hours. Staff.

Other Courses in Education

In addition to the courses previously described, the following courses are also offered, usually in the Summer Session and Evening Division.

Number	Title	Credit Hours
7	Educational Psychology	3
53	Psychology of the Exceptional Child	3

75	Driver Education Workshop, Basic	3
172	The Creative Process Through Art	3
175	Driver Education, Advanced.....	3
209	Education of Teachers of the Mentally Retarded I— Early Years	3-6
210	Education of Teachers of the Mentally Retarded II— Later Years	3-6
214	The Slow Learner (Education of the Exceptional Child)	3-6
215	The Gifted Child	3
240	Musical Creativity in the Junior	3
241	Science for the Elementary School	3
243	Recent Trends in Music Education	3
244	Social Studies in the Elementary	3
253	Practicum in Music Education	1-4
256	Methods and Materials in Elementary School Mathematics	3
270	Kindergarten Methods and Organization	3
271	Laboratory Experiences in Kindergarten Education	3
290	Basic Concepts in Music Education	3
291	Psychology of Music	3

Engineering, Civil

COLLEGE OF ENGINEERING, MATHEMATICS AND BUSINESS ADMINISTRATION

Professors Cassell and Oppenlander (Chairman); Associate Professors Dawson, Downer, and Fay; Assistant Professors Hemenway, Laible and Olson; Engineer Dunham; Adjunct Professor Knight; Professor Emeritus Milbank.

01 STATICS (3-0) Fundamentals of statics; composition and resolution of forces; the analysis of force systems in two and three dimensions; and centroids and moments of inertia. *Prerequisite:* mathematics 14. Three hours. Staff.

02 DYNAMICS (3-0) Fundamentals of kinematics covering rectilinear and curvilinear motion, relative motion. Coriolis acceleration, translation, rotation, and plane motion; fundamentals of kinetics covering translation, rotation, and plane motion of particles and rigid bodies; work, energy, power; impulse and momentum; and simple harmonic motion. *Prerequisite:* 01. Three hours. Staff.

10 SURVEYING (3-4) Fundamental surveying methods; propagation of errors as applied to surveying measurements; triangulation; control surveys; and traverse adjustments. *Prerequisite:* mathematics 13. Four hours. Staff.

11 GEOMETRONICS (2-4) Selected items in analytical photogrammetry; celestial observations, elements of photo-interpretation; theory of curves; and digital terrain analysis. *Prerequisite:* 10 or 12 and mathematics 14. Three hours. Staff.

12 PLANE SURVEYING (3-4) Fundamental surveying methods; elements of topographic surveying; and special problems according to student interest. For those not enrolled in civil engineering. *Prerequisite:* mathematics 2 and 9. Four hours. Staff.

100 MECHANICS OF MATERIALS I (3-0) The elastic and plastic behavior of materials; normal and shearing stresses from axial, torsional, and flexural loading combinations; deflections due to torsion and bending; applications to statically

indeterminate members; analysis of plane stress and strain; failure theories; and design criteria. *Prerequisite:* 01. Three hours. Staff.

101 MECHANICS OF MATERIALS LABORATORY (0-3) Experimental stress analysis methods; fundamental properties of metals, plastics, and wood; and the effects of size, shape, method and speed of loading, and strain history on these properties. *Prerequisite:* 100. One hour. Staff.

120 ENGINEERING CONTRACTS (2-0) Contract law; engineering specifications; and ethics and professional conduct. *Prerequisite:* junior standing. Two hours. Staff.

140 TRANSPORTATION ENGINEERING (3-0) Analysis of transportation systems; planning studies for highways, airports, rail and mass transport, pipelines, and belt systems; traffic flow phenomena; geometric design; economic analysis during planning, design, and construction phases; and critical path scheduling techniques. *Prerequisite:* 10, and junior standing. Three hours. Messrs. Dawson and Oppenlander.

150 SANITARY ENGINEERING I (3-0) The theory and design of water supplies, treatment processes, and distribution systems. *Corequisite:* 160. Three hours. Messrs. Cassell and Hemenway.

151 SANITARY ENGINEERING II (2-3) The theory and design of waste water collection systems and primary, secondary and tertiary waste water treatment plants; and laboratory studies on waste water characteristics and treatment. *Prerequisite:* 150, chemistry 1-2. Three hours. Messrs. Cassell and Hemenway.

160 HYDRAULICS (3-3) Mechanics of fluids with emphasis on incompressible fluids; flow meters; flow in closed conduits and open channels; elements of hydraulic machinery; laboratory studies of flow in closed conduits and open channels; and experiments with hydraulic machinery. *Prerequisite:* 02. Four hours. Mr. Downer.

161 FUNDAMENTALS OF FLUID MECHANICS (3-0) An introduction to the statics and dynamics of fluids. One-third to one-half of the semester will be spent on acquiring the necessary level of competence in mathematics, statics, and dynamics. *Prerequisite:* one year of college calculus and one year of related science. Three hours. Staff.

162 APPLIED FLUID MECHANICS (3-3) The application of basic principles of fluid mechanics to practical problems; flow in closed conduits and open channels; and hydraulic structures and machinery. *Prerequisite:* 161. Four hours. Staff.

163 PRINCIPLES OF HYDROLOGY (3-0) A systematic analysis of the distribution and movement of water in the environment; detailed discussion in non-mathematical terms of the occurrence, distribution, and movement of water through the main phases of the hydrologic cycle; precipitation, interception, evaporation, soil moisture, groundwater, and runoff; and methods of measurement of a wide range of hydrologic parameters. *Prerequisite:* junior standing and one year of college science. Three hours. Mr. Downer.

170 STRUCTURAL ANALYSIS I (3-3) Analysis and design of statically determinate structures; consideration of function, expected loads, reactions, material choice, and layout of members; influence lines; criteria for positioning moving loads; design of steel and timber members under combined bending and axial loads; base plates; eccentric connections; and laboratory practice in graphic statics and design computations. *Prerequisite:* 100. Four hours. Mr. Laible.

171 **STRUCTURAL ANALYSIS II (3-0)** Analysis of statically indeterminate structures by consistent deformation, least work, slope deflection, and moment distribution; determinations of deflections by virtual work, moment area, conjugate beam, and Williot-Mohr diagram; continuous structures; and an introduction to structural dynamics. *Prerequisite:* 170. Three hours. Mr. Laible.

172 **ADVANCED STRUCTURAL DESIGN (3-3)** Advanced theory and design of structures with emphasis on continuous frames and trusses; consideration of wind stress analysis, space frames, moment connections, and camber diagrams; comparative studies of specifications for design in steel and aluminum; and laboratory problems in design of steel building frames and continuous girder and truss bridges. *Prerequisite:* 171. Four hours. Mr. Dunham.

173 **REINFORCED CONCRETE (3-0)** Analysis of stresses in plain and reinforced concrete members; design of reinforced concrete structures; and theory of prestressed concrete. *Prerequisite:* 171 or concurrent enrollment. Three hours. Mr. Dunham.

180 **SOIL MECHANICS (3-3)** Identification, description, and physical properties of soils and other particulate systems; subsurface exploration; and engineering characteristics of natural deposits; consideration of stress distribution, permeability, consolidation, shear strength, and stability of soils; and laboratory practice in testing for index properties, permeability, consolidation, shear, and the effects of additives and cementing agents on particulate systems. *Prerequisite:* 100. Four hours. Mr. Olson.

181 **SUBSTRUCTURE ANALYSIS AND DESIGN (3-3)** Evaluation of subsoil conditions and earth pressures; and design of retaining walls, substructures for buildings and bridges, and cofferdams. *Prerequisite:* 173 and 180. Four hours. Mr. Olson.

190 **SPECIAL PROJECTS (3-0)** Independent investigation of a special topic under the guidance of a faculty member. The course work may consist of library investigations, unique design problems, and laboratory and field studies. Preparation of a formal report on the problem is required. *Prerequisite:* senior standing and departmental permission. Three hours. Staff.

200 **MECHANICS OF MATERIALS II (3-0)** The study of stresses and strains at a point under plane and three-dimensional loading using Mohr's circle; failure theories and energy methods; and plastic design and buckling of plates and shells. *Prerequisite:* 172 or concurrent enrollment. Three hours. Staff.

210 **AIRPHOTO INTERPRETATION (2-3)** Techniques in aerial photographic interpretation; principles of stereoscopic viewing and identification of the airphoto features related to land form, vegetation, drainage, soil color tone, and topography, and cultural features; special techniques in remote sensing; and the use of airphoto interpretation in soil identification, agricultural and forest surveys, water and air resource studies, regional and urban planning, and site and route locations. *Prerequisite:* senior or graduate standing. Three hours. Mr. Olson.

220 **CONSTRUCTION ENGINEERING (3-0)** Discussion of construction processes; relationship of techniques to design details and specification requirements; sequence studies by means of CPM and PERT; measurements of construction efficiency, cost estimating, and specifications; and case studies of local projects. *Prerequisite:* senior or graduate standing. Three hours. Mr. Dunham.

225 **ENGINEERING ECONOMY (3-0)** Mathematical comparison of alternatives to maximize the financial return on engineering decisions and processes; project

feasibility studies and design decision making; effect of taxes on engineering decisions; and analysis of risk and uncertainty. *Prerequisite:* senior or graduate standing. Three hours. Mr. Dawson.

226 CIVIL ENGINEERING SYSTEMS ANALYSIS (3-0) Development of operations research techniques including linear and dynamic programming, inventory theory, replacement theory, queuing models, networks, and scheduling; procedures for solving complex problems; and application of systems analysis to problems in civil engineering. *Prerequisite:* senior or graduate standing. Three hours. Messrs. Dawson and Oppenlander.

230 URBAN PLANNING TECHNIQUES (3-0) Theories on the size, spacing, and functions of cities; economic, social, and physical determinants of various land-use elements; basic studies for urban planning; and the process of land-use planning including location and space requirements and the development of the land-use plan. *Prerequisite:* senior or graduate standing. Three hours. Messrs. Dawson and Oppenlander.

231 URBAN PLANNING ANALYSIS (3-0) History and development of urban planning; approaches to planning with attention to city design and appearance, quantitative methods in planning, and social welfare planning; plan implementation; organization and administration of planning agencies; and financial planning. *Prerequisite:* senior or graduate standing. Three hours. Mr. Oppenlander.

232 COMMUNITY DESIGN Basic principles and methods of planning and designing the total community; site selection; and elements of physical layout and design. Design projects dealing with community elements such as subdivisions, industrial parks, new towns, etc. Three hours. Messrs. Oppenlander and Sargent.

233 REGIONAL PLANNING (see Resource Economics 223).

240 TRAFFIC ENGINEERING CHARACTERISTICS (3-0) Basic components of highway travel including driver, vehicle, roadway, environmental, and pedestrian characteristics; traffic flow and intersection characteristics; highway and intersection capacities; performance of traffic systems; and techniques for measuring traffic characteristics. *Prerequisite:* senior or graduate standing. Three hours. Mr. Dawson.

241 TRANSPORTATION SYSTEMS ENGINEERING (3-0) Interdisciplinary aspects of transportation systems and their technological characteristics; mathematical analysis and synthesis of system problems; economic consideration of transportation; fiscal studies and financial planning; and administration of transportation systems. *Prerequisite:* senior or graduate standing. Three hours. Mr. Dawson.

242 TRAFFIC ENGINEERING OPERATIONS Design and application of traffic control devices including signals, signs, and markings; regulation of traffic flows, speeds, and parking; safety engineering; design of off-street parking facilities; and evaluation of traffic engineering improvements. *Prerequisite:* 240. Three hours. Staff.

243 HIGHWAY GEOMETRIC DESIGN Theory and practice of geometric design for rural and urban highways; route location; design controls and standards; and design of geometric elements including sight distance, horizontal and vertical alignments, cross-section, intersections, and interchanges. Three hours. Mr. Oppenlander.

244 URBAN TRANSPORTATION SYSTEMS Transportation planning process for urban areas; inventory, use, and desire studies for urban transportation; tech-

niques of travel forecasting and trip generation, distribution, and assignment; planning, design and operation of mass transit systems; location and design of terminal facilities. Three hours. Mr. Oppenlander.

250 DESIGN OF WATER TREATMENT FACILITIES (1-6) Design of treatment systems to provide water for domestic and industrial use; and source evaluation, demand projections, specific treatment processes, distribution systems, economics, and case studies. *Prerequisite:* 150. Three hours. Mr. Cassell.

251 DESIGN OF WASTEWATER TREATMENT FACILITIES (1-6) Design of treatment systems for processing wastewaters from municipal and industrial sources; and population projections, site location, collection systems, lift stations, choice and sizing of unit processes, specification writing, cost estimates, and bid document preparation. *Prerequisite:* 151. Three hours. Mr. Cassell.

252 INDUSTRIAL WASTE DISPOSAL (3-0) Fundamental chemical, physical, and biological processes employed in treatment and disposal of pollutants from the following industries: mining and metal processing, refinery and petrochemical, pulp and paper, food and meat processing, textiles, and electric generation. *Prerequisite:* 151. Three hours. Mr. Hemenway.

253 AIR POLLUTION ABATEMENT (3-0) Identification of specific air pollutants and their effects on humans, plants, and materials; concepts, principles, and application of air pollution control processes; and electrostatic precipitation, scrubbing, cyclonic separation, filtration, absorption, catalytic oxidation, and dispersion. *Prerequisite:* Chemistry 5 and Physics 25. Three hours. Mr. Hemenway.

254 SOLID WASTES (3-0) The significance of solid wastes generated from municipal, industrial, agricultural, and mining sources; the optimization and design of collection, disposal, and/or recycle systems; and sanitary landfills, incineration, composting, and material recovery. *Prerequisite:* Chemistry 5 and Physics 25. Three hours. Mr. Cassell.

255 UNIT OPERATIONS OF WATER AND WASTEWATER TREATMENT (1-6) Examination of major physical, chemical, and biological processes used in treating water and wastewater; theory and methods of obtaining data from bench through full scale units; analysis of data to obtain process optimization and design. *Prerequisite:* 151. Three hours. Mr. Cassell.

260 HYDROLOGY (3-0) The basic theory of precipitation, run-off, infiltration, and ground water; precipitation and run-off data; and application of data for use in development of water resources. *Prerequisite:* 160 or Mechanical Engineering 142. Three hours. Mr. Downer.

261 OPEN CHANNEL FLOW (3-0) Application of the basic laws of fluid mechanics to flow in open channels; boundary layer theory; design of channels and transition structures; non-uniform flow; and non-uniform, spatially-varied flow problems. *Prerequisite:* 160, Mathematics 271. Three hours. Mr. Downer.

263 MEASUREMENTS IN APPLIED HYDROLOGY (2-3) Design of hydrologic experiments; observational methods, equipment and problems in describing precipitation, runoff, air temperature, relative humidity, wind movement, solar radiation, evaporation, soil temperature, infiltration, soil moisture, soil density, soil water pressure, sediment load, and snow density; data reduction and handling techniques; and application to the instrumentation and study of the hydrology of a small watershed. *Prerequisite:* 163 or 260. Three hours. Mr. Downer.

270 **ADVANCED INDETERMINATE STRUCTURES (3-0)** Matrix analysis of one, two, and three dimensional indeterminate structures using the finite-element approach; formulation and solution by the flexibility and direct stiffness matrix methods; emphasis on computer applications. *Prerequisites:* 171 and a basic knowledge of matrix algebra. Three hours. Mr. Laible.

271 **PRESTRESSED CONCRETE STRUCTURES (3-0)** Ultimate strength theory for concrete structures with emphasis on prestress effects; prestressed beam analysis, load balancing methods, columns, and piles, bent analysis, yield-line theory, and circular prestressing in domes and tanks; and discussion of current design specifications. *Prerequisite:* 173. Three hours. Mr. Dunham.

280 **APPLIED SOIL MECHANICS (3-0)** Use of soil mechanics in the evaluation of building foundations, braced excavations, earth structures; lateral earth pressures, pile foundations, pier and caisson foundations, slope stability, and construction problems. *Prerequisite:* 180. Three hours. Mr. Olson.

281 **HIGHWAY AND AIRPORT PAVEMENT DESIGN (3-0)** Structural design of flexible and rigid pavements; types of wheel and axle configurations; soil classification; compaction of soils; frost action; subsurface drainage; design of bases and subbases; soil stabilization, theory of stresses in flexible pavements; plate bearing, triaxial and CBR methods of design; Westergaard analysis for rigid pavements; design of joints and reinforcing steel; and pavement evaluation. *Prerequisite:* 140, 180. Three hours. Mr. Olson.

282 **ENGINEERING PROPERTIES OF SOILS (2-3)** Study of soil properties that influence the engineering behavior of soils; subject areas include soil mineralogy, physicochemical concepts, plasticity properties, permeability and compaction; and laboratory study of soil index properties, permeability, and compaction tests. *Prerequisite:* 180. Three hours. Mr. Olson.

283 **ADVANCED ENGINEERING PROPERTIES OF SOILS** Detailed study of soil properties that affect the compressibility and shear strength of natural soil deposits. Laboratory work includes extensive studies of consolidation and compressibility and use of the latest methods of shear strength determination. Three hours. Mr. Olson.

284 **THEORETICAL SOIL MECHANICS** Theories of soil mechanics, failure conditions, mechanical interaction between solids and water; and problems in elasticity and plasticity pertaining to earth masses. Three hours. Mr. Olson.

290 **ENGINEERING INVESTIGATION (3-0)** Independent investigation of a special topic under the guidance of a staff member. The course work may consist of literature investigations, unique design problems, and/or laboratory and field studies. Preparation of an engineering report is required. *Prerequisite:* senior standing or departmental permission. Three hours. Staff.

Engineering, Electrical

COLLEGE OF ENGINEERING, MATHEMATICS AND BUSINESS ADMINISTRATION

Professors Evering, Handelsman, Lai, Lambert, Roth and Rush (Chairman); Associate Professors Absher, Mirchandani, Taylor and Williams.

3 ENGINEERING ANALYSIS II (3-0) Input-output relations of systems. Ordinary linear differential equations with specific application to linear systems. Response of systems to exponential excitation and concept of complex frequencies. Impulse response. Steady-state response of linear systems. System functions. Resonance. Network theorems. Energy and power. *Prerequisite:* Math. 11 or 13. Three hours.

4 ENGINEERING ANALYSIS III (3-0) Coupled circuits and transformers. Non-linear elements. Fourier series and integrals. Laplace transformation. Two-part networks. *Prerequisite:* 3. Three hours.

31 ENGINEERING COMPUTATION I (2-0) Analog and hybrid computing devices. Simulation of linear algebraic and dynamic systems. Various mathematical operations. Non-linear problems. Conversion between analog and digital domains. Scaling. *Prerequisite:* concurrent enrollment in Math. 123. Two hours.

32 ENGINEERING COMPUTATION II (2-0) Introduction to digital computers. Hardware and software structure. Solution of electrical engineering problems using digital computer techniques. *Prerequisite:* E.E. 31. Two hours.

91, 92 THEORY AND PRACTICAL APPLICATIONS OF ELECTRICAL, MAGNETIC AND ELECTRONIC CIRCUITS (3-0) For non-engineering students. Typical topics include audio systems, television and computers. *Prerequisite:* High school algebra. May not be taken for credit in place of E.E. 101, 102. Three hours.

101, 102 ELECTRICAL ENGINEERING PRINCIPLES (3-3) Principles of electric and magnetic circuits; application of these principles to the theory and performance of selected power, control and communication equipment. *Prerequisite:* mathematics 123 and physics 27, 101 for 102. Four hours.

111 CONTROL SYSTEMS (3-0) Theoretical background for analysis and synthesis of feedback control systems. Concepts of stability, transfer functions, signal flow, performance criteria, compensation and the classical root-locus and frequency response methods. State variable approaches. Analog simulation as a design tool. *Prerequisite:* 4. Three hours.

113 ENERGY CONVERSION I (3-0) Principles basic to electromechanical energy conversion devices and systems. Concepts associated with the interchange of energy among electrical magnetic and mechanical circuit elements. Continuous energy conversion in the ideal and practical rotating machine. Machine dynamics. *Prerequisite:* 4. Three hours.

114 ENERGY CONVERSION II (3-0) Six basic methods of Direct Energy Conversion (DEC): thermoelectric devices, thermionic devices, magnetohydrodynamic (MHD) converters, solar cells and fuel cells, electrohydrodynamic (EHD) converters. Modern solid state theories of DEC. The past, present, and future of DEC. *Prerequisite:* 113, 163. Three hours.

121 ELECTRONICS I (3-0) Properties of semiconductors. PN junctions. Application of diodes. Circuit models for transistors, vacuum tubes, and other active devices. Biasing techniques and regions of operation. *Prerequisite:* 4. Three hours.

122 ELECTRONICS II (3-0) Properties of amplifiers. Amplifier design. Feedback and oscillation in electronic circuits. High-frequency circuit models and limitations. *Prerequisite:* 121. Three hours.

123 ELECTRONICS III (3-0) Analysis of pulse and digital circuits. Design of transistor logic gates, multivibrators, and blocking oscillators. *Prerequisite:* 122. Three hours.

143, 144 ELECTROMAGNETIC FIELD THEORY (3-0) Basic laws and elementary applications of electromagnetic fields; electrostatics, magnetostatics, Faraday's law, Maxwell's equations, plane waves, transmission lines, waveguides, and antennas. *Prerequisite:* 4. Three hours.

146 WAVE AND DIFFUSION ANALOGIES (3-0) Electromagnetic waves on lines in space. Vibration of strings and membranes. Mechanical waves in fluids and solids. Electromechanical transducers. Thermal waves Diffusion process. *Prerequisite:* 144. Three hours.

162 SOLID STATE PHYSICAL ELECTRONICS I (3-0) Introduction to the physics of atoms and crystals through quantum and statistical mechanics. Application of these principles to semiconductor devices. *Prerequisite:* physics 128. Three hours.

163 SOLID STATE PHYSICAL ELECTRONICS II (3-0) Theories of conductivity, dielectric constant, magnetic permeability, optical properties, piezoelectricity, ferroelectricity, pyroelectricity, magnetostriction. *Prerequisite:* 162, physics 128. Three hours.

171 SIGNALS AND SYSTEMS (3-0) Fourier series and Fourier integral. Pulse, periodic, and random signals and their spectra. Correlation functions and power spectra of signals. Transmission of signals through linear systems. *Prerequisite:* 4, mathematics 203. Three hours.

174 INFORMATION-TRANSMISSION SYSTEMS (3-0) Introduction to information transmission. Modulation and demodulation. Noise and noise figures. Comparison of information transmission systems. Transmission lines and propagation. *Prerequisite:* 171. Three hours.

Laboratories

Each student will keep a laboratory notebook which will be collected and checked periodically by the instructor. He will prepare one experiment in a form suitable for publication and will present his paper to the class and other interested persons. The student will be graded on the notebook as well as the final written and oral presentation.

81 SOPHOMORE LABORATORY (0-3) Direct current measurements, nonlinear resistive elements, electron ballistics, the cathode ray oscilloscope, transients in RC circuits, alternating current measurements, sinusoidal behavior of RL and RC circuits, transients and sinusoidal behavior of RLC circuits. One hour.

82 SOPHOMORE LABORATORY (1-3) Alternating current bridges, resonant harmonic analyzer, acoustic resonance, measurement of charge, current, voltage, power, resistance, capacitance, inductance, and time. *Prerequisite:* 81. Two hours.

183 JUNIOR LABORATORY (1-3) Two dimensional field mapping; electrostatic field plots, duals, and analogs; magnetic fields and circuits; magnetic forces and the magnetic field as an energy source. Input-output characterizations of linear time invariant systems. Introduction to active circuits; amplification and oscillation. *Prerequisite:* 82. Two hours.

184 JUNIOR LABORATORY (1-3) Active device characteristics, Power supplies, a.m. and f.m. modulation and detection. Transformers, magnetic amplifiers, a-c and d-c machines. *Prerequisite:* 183. Two hours.

185 SENIOR LABORATORY (1-3) Electrical conductivity in solids, the Hall effect, properties of gaseous conductors and dielectric materials. Control systems. Electromechanical transducers. *Prerequisite:* 184. Two hours.

186 SENIOR LABORATORY (0-3) Design and construction of pulse and digital circuits including logic gates, astable multivibrators, bistable multivibrators, monostable multivibrators, and locking oscillators. *Prerequisite:* 185. One hour.

187, 188 SENIOR PROJECT (0-3), (0-3) Experimental or theoretical project selected by the student and conducted under staff supervision. One hour.

201 LINEAR SYSTEM THEORY (3-0) Introduction to linear system theory and application to the processing and control of information. Mathematical models and classification of systems. Lagrangian and Hamiltonian formulation. Time-invariant and time-varying differential systems. Characterization by impulse response and integral transforms. Methods of analysis. Adjoint system and implications. Characterization and analysis of linear discrete-time systems. *Prerequisite:* Math 124 or equivalent background. Three hours. Staff.

202 NETWORK ANALYSIS (3-0) Introduction to modern network analysis through a topological study of networks with emphasis on electrical networks. Graph theory. Fundamental principles and theorems. State variable characterization of linear, nonlinear and time-varying networks. Other methods of characterization. Analysis using linear algebra concepts. Computational problems. *Prerequisite:* EE 171 and Math 124 or equivalent background. Three hours. Staff.

205, 206 NETWORK SYNTHESIS (3-0) Design of linear and nonlinear networks using the digital computer. Review of classical realizability theory of passive networks. Computer oriented topics including: Linear algebraic computational and numerical integration problems. Concepts of modelling. Optimization methods. Worst case design. Use of analysis programs. Discussion of recent methods and developments. *Prerequisite:* 202. Knowledge of programming helpful but not necessary. Three hours. Staff.

230 DIGITAL COMPUTER LOGIC, CIRCUITS AND SYSTEMS (3-0) The logical design digital computers. Boolean algebra as an aid to circuit design. Circuits and components for the transmission, storage and modification of information and their combination into arithmetic units, memory devices, program controls and micro-processors. *Prerequisite:* 123 or physics 213. Three hours. Staff.

231 COMPUTER APPLICATIONS TO DESIGN AND MANUFACTURING (3-0) Computer hardware and software concepts. Basic and advanced APL (Program Language), practical computer applications in information management and process control. *Prerequisite:* department permission. Three hours. Staff.

232, 233 HYBRID COMPUTERS (3-0) Systems design concepts and use of interconnected analog and digital computers as an engineering tool are stressed. Selected problems from mathematics, biological and physical sciences are solved on a hybrid computer. The use of logic and decision as well as analog/digital and digital/analog conversion are stressed. *Prerequisite:* 123 or departmental permission. Three hours.

235 ELECTRONIC INSTRUMENTATION FOR SCIENTISTS (3-3) Introduction to electrical components and circuit theory, electrical measurements, oscilloscopes, power supplies, amplification by vacuum tubes and transistors, oscillators, comparison measurements, servo systems, operational amplifiers for measurement and control, electronic switching circuits, timing and digital counting systems. This course may not be taken for credit by students in Electrical Engineering.

Prerequisite: College physics and calculus or permission of the instructor. Four hours. Mr. Evering.

236, 237 FUNDAMENTALS OF DIGITAL COMPUTER DESIGN (3-0), (3-0) Fundamentals of logic design. Design of combinational and sequential logic circuits. Implementation of arithmetic operations. Memory systems. Instruction codes. Dynamic storage allocation. No graduate credit for electrical engineering majors. *Prerequisite:* Math 116 or E.E. 32 or equivalent, 236 for 237. Three hours.

238 COMPUTER ASSISTED DESIGN (2-0) Circuit design, modeling and analysis via visual display computer terminals. Use of ASTAP system to analyze device characteristics and diffusion parameters. *Prerequisite:* E.E. 261 and departmental permission. Two hours. Staff.

239 TRANSIENT PHENOMENA (3-0) Study of complex variable basis of Laplace and Fourier Transforms; applications to transient behavior of lumped and distributed parameter systems, root locus. Nyquist criterion and two dimensional field problems. *Prerequisite:* 4. Three hours. Mr. Rash.

240 BOUNDARY VALUE PROBLEMS IN ELECTROMAGNETISM (3-0) Solution of classical problems of electromagnetism using images, conformal mapping and separation of variables methods. *Prerequisite:* 144. Three hours. Mr. Rush.

242 THEORY AND APPLICATIONS OF TIME-VARYING FIELDS (3-0) Maxwell's Equations and boundary conditions for time varying systems. Propagation and reflection of electromagnetic waves, guided electromagnetic waves, resonant cavities, and microwave networks. *Prerequisite:* 240 or departmental permission. Three hours. Mr. Handelsman.

244 RADAR SYSTEMS ENGINEERING (3-0) Radar theory including antennas, propagation, signal detection and parameter estimation. Applications including search and track radars, aircraft control and landing, radio/radar astronomy, and modern phased array radars. *Prerequisite:* EE 174. Three hours. Mr. Handelsman.

251 APPLICATIONS OF LINEAR ALGEBRA (3-0) Introduction of basic definitions and concepts of linear algebra; formulation and solution of engineering problems. Definitions of linear vector and function spaces, subspaces and manifolds, linear operators, change of basis, spectral representation of operators, the eigenvalue problem, matrices and functions of matrices. Application to problems of state variable analysis, field theory, mechanics, quantum mechanics and signal theory. *Prerequisite:* Graduate standing in EE or Physics or departmental permission. Three hours. Mr. Rush.

261 TRANSISTOR ENGINEERING (3-0) Introduction to energy band theory and the effective mass concept. Analysis of the transport properties of holes and electrons. Characteristics of PN junctions. Theory of transistors as developed from drift and diffusion properties of carriers. Charge control model of transistor switch. *Prerequisite:* mathematics 121 or 123. Three hours. Mr. Lambert.

262 TRANSISTORS (3-0) The fundamental principles of semi-conductor operation. P and N type conductivity; the PN junction; construction of the junction transistor. Circuit analysis of transistor operation in terms of hybrid parameters. Analysis of MOSFET device characteristics and equivalent circuits. *Prerequisite:* 261. Three hours. Staff.

270, 271 SIGNAL THEORY Analysis and representation of nonrandom and random signals. Discrete signals, Signal-space concepts. Random processes. Correlation function and power density spectrum. Measurement techniques. Appli-

cations. *Prerequisite:* Graduate standing in Electrical Engineering or concurrent enrollment in 174, 270 for 271. Three hours. Mr. Lai.

272 **INFORMATION THEORY (3-0)** Introduction to probability concepts of information theory; entropy of probability models; theoretical derivations of channel capacity; coding methods and theorems, sampling theorems. *Prerequisite:* mathematics 203. Three hours.

281 through 284 **SEMINAR (1-0)** Presentation and discussion of advanced electrical engineering problems and current developments. *Prerequisite:* senior or graduate engineering enrollment. One hour.

285 **CREATIVE ENGINEERING (3-0)** Creative techniques and applications to typical problems of commercial importance in fields of process control, biomedical engineering communications, circuit design. *Prerequisite:* graduate standing in EE or departmental permission. Three hours. Mr. Roth.

287, 288 **SPECIAL TOPICS (3-0)** Formulation and solution of theoretical and practical problems dealing with electrical circuits, apparatus, machines or systems. *Prerequisite:* 4. Three hours.

Engineering, Mechanical

COLLEGE OF ENGINEERING, MATHEMATICS AND BUSINESS ADMINISTRATION

Professors von Turkovich (Chairman), Outwater, Martinek, and Tuthill; Associate Professors, Carpenter, Duchacek, Hundal, Marshall, and McLay; Assistant Professor, Pope; Adjunct Professors, Gardiner, Liu and Zubko.

1 **TECHNICAL GRAPHICS I (0-6)** Familiarization with and use of drawing materials and equipment; geometric constructions; free hand sketching and lettering; pictorials; charts and graphs; orthographic projection and multiview drawings; topographic drawings; introduction to descriptive geometry. Two hours. Mr. Tuthill.

2 **ENGINEERING GRAPHICS II (0-6)** A continuation of the application of orthographic principles to technical problems covering intersections and development. Axonometric projection. *Prerequisite:* 1. Two hours.

53 **MANUFACTURING PROCESSES (2-3)** Theory and principles of casting and molding, metal forming, welding, machining and finishing processes with emphasis on economics and design. *Prerequisite:* 2. Three hours.

73 **CREATIVE DESIGN (3-0)** Application of fundamental engineering principles to the solution of real engineering problems through formulation, selection, synthesis, analysis, optimization, oral and written presentation. *Prerequisite:* sophomore standing in ME. Three hours.

92 **THERMODYNAMICS I (3-0)** Engineering thermodynamics with particular emphasis on energy forms, the development of thermodynamics laws, equilibrium, fixed and variable mass systems, reversibility, and entropy. *Prerequisite:* mathematics 14, physics 18. Three hours.

100 **MATERIALS I (3-0)** (See C.E. 100, Mechanics of Materials I).

101 MATERIALS II (3-0) Electronic, atomic and crystal structures; imperfections; phases in solids; equilibrium diagrams; non-equilibrium transformations; thermodynamics of solids and surfaces; rates of reaction diffusion; corrosion. *Prerequisite:* 100. Three hours. Staff.

102 MATERIALS III (3-0) Mechanical testing; fracture and failure mechanisms; strengthening mechanisms; ceramics; polymers; plastic deformation. *Prerequisite:* 101. Three hours. Staff.

111 THERMODYNAMICS II (3-3) Properties and processes of fluids; the perfect gas, and approximate relationships for real gases; application of thermodynamics principles to areas such as combustion, mixtures, power cycles, gas compression, and refrigeration. Laboratory on problems and analysis. *Prerequisite:* 92. Three hours.

113 THERMODYNAMICS AND HEAT TRANSFER (3-0) Fundamental principles of engineering thermodynamics; application of these principles to thermodynamic cycles; heat transfer. *Prerequisite:* physics 18; mathematics 14. Three hours.

115 THERMODYNAMICS (3-0) The first and the second law of the classical thermodynamics; introduction to statistical mechanics, Boltzmann, Bose-Einstein and Fermi-Dirac statistics, partition function; microcanonical, canonical and grand canonical ensembles; kinetic theory of gases; introduction to statistical thermodynamics; derivation of thermodynamic properties of perfect gases and solids; Maxwell relations; chemical equilibrium; the behavior of real gases and liquid; phase equilibrium and multicomponent systems. *Prerequisite:* physics 28, mathematics 14. Three hours.

119 ENGINEERING EXPERIMENTATION (1-1) Engineering Measurements; experimental error; test sequences; data analysis. Experiments using the project method to investigate engineering principle, instrument capability and the theory of experimentation. *Prerequisite:* junior standing. Two hours.

131 MATERIALS PROCESSING I (2-3) The fundamentals of forming and material removal in the solid state, in particular, underlying aspects of plastic deformation, energy requirement and overall economics are stressed. *Prerequisite:* CE 100. Three hours.

133 DYNAMICS I (3-0) Fundamentals of kinematics; analysis and synthesis of displacement, velocity and acceleration with respect to fixed and moving frames of reference; principles of particle and rigid body motion; conservation principles of dynamics and their application in the solution of dynamics problems; dynamic analogies between mechanical, fluid and electrical systems. *Prerequisite:* CE 01. Three hours.

135 ENGINEERING DESIGN I (3-3) Application of the principles of kinematics, dynamics, strength of materials and design to the design of machine elements including consideration of function; production and economic factors; with special emphasis on engineering mechanics. *Prerequisite:* 133, CE 100. Four hours.

137 SYSTEMS CONTROL (2-0) Concepts of control, stability and interaction of systems with particular reference to design of mechanical, pneumatic, hydraulic and other control circuits. *Prerequisite:* mathematics 271. Two hours.

142 FLUID MECHANICS (3-0) Dynamics of an ideal fluid; energy and momentum relations; similitude flow in conduits; boundary layer mechanics; compressibility phenomena; wing theory; hydrodynamic lubrication; fluid machines and controls. *Prerequisite:* 111 or 113, 133. Three hours.

191, 192 **THESIS (0-9)** Investigation of a research or design project under the supervision of an assigned staff member culminating in an acceptable thesis. *Prerequisite:* senior standing and departmental permission. Three hours.

200 **THE ENGINEERING PROFESSION (2-0)** The professional practice of engineering; laws and professional attitudes regarding design, standards of patient safety, liability, insurance, industrial hygiene and contracts. *Prerequisite:* senior standing. Two hours.

201 **SAFETY ENGINEERING (2-0)** Safety management, safety standards including OSHA, human factors, recognition and control of hazards. *Prerequisite:* senior standing in engineering or business administration or permission of instructor. Two hours.

202 **DYNAMICS II (3-0)** Advanced topics in dynamics of particles and systems of particles. Space motion in fixed and moving frames of reference. Impulse and momentum. Central force motion. Kinematics and kinetics of rigid bodies. Euler's equations of motion. Gyroscopic effects in mechanical systems. *Prerequisite:* 133. Three hours. Staff.

203 **MECHANICAL VIBRATIONS (3-0)** Vibration phenomena in single and multi-degree of freedom systems. Response of systems to periodic and transient excitation. Isolation of shock and vibration. Impedance; matrix and numerical methods for vibration problems. *Prerequisite:* senior standing. Three hours. Mr. Hundal.

204 **ADVANCED SYSTEMS ANALYSIS (3-0)** Lumped-parameter and distributed-parameter systems analysis of mechanical thermal, hydraulic, pneumatic and electromechanical systems; system response to periodic, transient and random excitation. *Prerequisite:* senior standing. Three hours. Staff.

206 **APPLICATION OF COMPUTERS IN ENGINEERING (4-0)** Utilization of analog, digital and hybrid computers as engineering tools for the solution of complex engineering problems. *Prerequisite:* senior standing. Four hours. Mr. Hundal.

211 **ADVANCED MECHANICAL STRUCTURE I (3-0)** Statically indeterminate problems in bending; general expression of strain energy; theorem of Castigliano and the unit load method; theory of curved beams; beams on elastic foundations; unsymmetrical bending; torsion of thin sections. *Prerequisite:* senior standing. Three hours. Mr. McLay.

222 **ADVANCED MECHANICAL STRUCTURES II (3-0)** Theory and applications of the force, and displacement matrix methods of analysis; basic theory of elasticity including analysis of stress, the equilibrium equations; analysis of strain, the compatibility equations, and generalized Hooke's law; introduction to plasticity; problems of plane stress and plane strain; finite differences and variational methods. *Prerequisite:* senior standing. Three hours. Mr. McLay.

231 **MATERIALS PROCESSING II (2-3)** Fundamentals of forming from liquid state, plastics forming, metal joining, powder metallurgy. *Prerequisite:* 113, CE 100. Three hours. Staff.

243 **ADVANCED FLUID MECHANICS (3-0)** Foundations of compressible flow; isentropic flow; normal and oblique shock waves; Prandtl-Myer flow; flow with friction and with heating and cooling; flow in electric and magnetic fields; potential flow; linearized flows; method of characteristics. *Prerequisite:* 142. Three hours. Mr. Duchacek.

244 COMPRESSIBLE FLOW (3-0) Introduction to flow in two and three dimensions; steady irrotational flow; small perturbations; the hodograph method; the Karman-Tsien, Prandtl-Glauert, and Gothert's methods; supersonic airfoils; the method of characteristics; oblique shocks; shock waves and boundary layer interaction. *Prerequisite:* 243. Three hours. Mr. Duchacek.

245 ADVANCED FLUID MECHANICS LABORATORY (0-3) Mechanics of fluids with emphasis on compressible flow; flow-measurement; fluid machinery; aerodynamics; compressible flow in nozzles and ducts; high Mach number effects; field mapping. *Prerequisite:* 243 or concurrent enrollment therein. One hour. Mr. Duchacek.

246 AERODYNAMICS (3-0) Application of the principles of fluid mechanics to the design and performance of aircraft; fluid dynamics; experimental facilities; airfoil characteristics; aspect ratio and plan-form influences; viscosity phenomena as applied to boundary layer; transition and separation on various shapes; compressibility phenomena; the optimum airfoil; performance. *Prerequisite:* 142. Three hours. Mr. Duchacek.

252 ENGINEERING DESIGN II (3-3) Application of the principles of kinematics, dynamics, strength of material, fluid mechanics and thermodynamics to the design of mechanical systems and their components; application of computers to design; design optimization; group projects in design; construction and evaluation. *Prerequisite:* 135. Four hours. Mr. Carpenter.

262 THERMAL SYSTEMS (3-3) Application of engineering thermodynamics to the analysis of thermodynamic machines and processes; problems of gas turbine, jet propulsion, nuclear power plants, energy conversion devices and other areas of current interest. *Prerequisite:* senior students. Four hours. Mr. Tuthill.

264 THERMAL ENVIRONMENTAL ENGINEERING (3-0) The principles of psychrometrics, heat transfer and fluid mechanics applied to thermal environments and their control for man, animal or process. *Prerequisite:* 111, 142, 266. Three hours.

266 HEAT TRANSFER (3-0) Fundamental principles of heat transfer; conduction, convection, radiation; steady and unsteady state; the electric analogy; applications to heat transfer equipment. *Prerequisite:* 111 or 113 and mathematics 271. Three hours. Mr. Duchacek.

267 ADVANCED THERMODYNAMICS (3-0) A rigorous detailed study of the laws of thermodynamics and of ideal and actual thermodynamic processes. *Prerequisite:* 111 or 113 and mathematics 271. Three hours. Mr. Tuthill.

272 MECHANICAL BEHAVIOR OF MATERIALS (3-0) Elastic and plastic behavior of single crystals and polycrystals; dislocations; approximate plastic analysis; anisotropic materials; hardness; residual stress, brittle, transitional and ductile fractures; fatigue; damping; creep and surface phenomena. *Prerequisite:* senior standing. Three hours. Mr. Outwater.

275 HUMAN FACTORS (2-3) Human sensory capabilities and limitations, design of information input, human motor activities and space relationships, intro. to work measurement. Three hours. *Prerequisite:* junior standing.

276 PLANT PLANNING AND DESIGN (3-3) Analysis of facilities and services requirements, material handling, office and clean room layout, mathematical and computer techniques, safety and plant conservation. Four hours. *Prerequisite:* 131 or permission of instructor.

281, 282 SEMINAR (1-0) Presentation and discussion of advanced mechanical engineering problems and current developments. *Prerequisite:* senior or graduate engineering enrollment. One hour. Staff.

284 ADVANCED HEAT ENGINES (3-0) Application of engineering science to specific types of heat engines according to the interest of the students. *Prerequisite:* 111, 142, 266. Three hours. Staff.

294 ENGINEERING DESIGN ANALYSIS AND SYNTHESIS (2-0) The application of fundamental principles of engineering and allied sciences, combined with economic considerations to decision-making processes in engineering problems. *Prerequisite:* senior standing. Two hours.

295, 296 SPECIAL TOPICS (3-0) Advanced study and discussion in areas dependent on the interest of the students. *Prerequisite:* senior or graduate standing and departmental permission. Three hours. Staff.

297 NUCLEAR ENGINEERING (3-0) Neutron chain reactions and the criticality condition; the slowing down of neutrons in an infinite medium; one-speed diffusion of neutrons in a multiplying and non-multiplying system combined slowing down and diffusion; bare and reflected homogeneous reactors; time-dependent behavior of reactors; reactor control theory; reactor accident and transient analysis. *Prerequisite:* senior standing. Three hours. Staff.

English

COLLEGE OF ARTS AND SCIENCES

Professors Bandel, Bogorad, Broughton, Cochran, Jones, Long, Orth, Poger, Rothwell (Chairman), and Shepherd; Associate Professors Clark, Hall, and Howe; Assistant Professors Biddle, Bradley, Dickerson, Edwards, Eschholz, Gutman, Huddle, Rosa, Seid, Simone, Stanton, Stephany, and Sweterlitsch; Instructors P. Bradley, Brookes, Carlson, Thompson, and Tyree; Experimental Program, M. Broughton, and M. Dickerson; Adjunct faculty, Devine.

Unless otherwise indicated, all courses in the Department of English carry three hours of credit.

1 WRITTEN EXPRESSION Primarily a course in writing with some selected readings as examples of style and ways of treating similar content. Staff.

2 GENRE: MULTI-GENRES An introduction to fiction, poetry, and drama—past and present, British and American. Staff.

3 GENRE: DRAMA An approach to the play as a work of literature and as a dramatic experience. The course will include a variety of Continental, British, and American drama and will range from the classical to contemporary periods. Staff.

4 GENRE: FICTION Exploration of a variety of fictional forms which will include the short story, novella, and the novel. Staff.

5 GENRE: POETRY An examination of the forms of poetry, past and present, British and American. The course will provide a wide variety of perspectives on the poem. Staff.

6 **THEME COURSE** Exploration of a single literary theme by examining a variety of genres. Subject matter will change from semester to semester. Some representative topics have been: War and Violence, Myth and Literature, and Ecology. Staff.

7, 8 **BRITISH LITERATURE** A survey of major figures in British literature such as Chaucer, Milton, Swift, Wordsworth and Shaw. The course is of special value to students planning for a major in English, though it has interest for anyone wishing a sound introduction to literary history. Staff.

9, 10 **AMERICAN LITERATURE** A survey of major American writers, from the beginning of the nineteenth century down to the present, such as Poe, Thoreau, Hawthorne, and Melville (9); Twain, Eliot, Hemingway, and Faulkner (10). Staff.

11, 12 **WORLD LITERATURE** A survey in comparative literature dealing with the great writers of the world to include Homer, Dante, Milton, and similar major figures. For students planning a major in English, this background is valuable in providing a context for English and American literature. Staff.

13 **INTRODUCTION TO THE ENGLISH LANGUAGE** Topics will include consideration of language as a part of human behavior, history of the language, dialects of American English, lexicography, and the new analyses of English. Mrs. Clark, Mr. Eschholz, and Mr. Rosa.

50 **EXPOSITORY WRITING** Writing and analysis of expository essays (sophomore standing a prerequisite). Mr. Howe, Mr. Sweterlitsch.

53 **WRITING: POETRY AND FICTION** An introductory course in the techniques of writing poetry and short prose fiction. Classes are organized around the discussion of student work and the problems arising from weekly writing assignments (preference in enrollment given to sophomores). Mr. Broughton, Ms. Edwards, Mr. Huddle.

Unless otherwise stated, the prerequisite for any course in the Department of English numbered 100-199 is 6 hours of English (or exemption), or junior standing and permission of instructor.

101 **CHAUCER** Mr. Stephany.

107, 108 **SHAKESPEARE** Miss Bandl, Mr. Howe, and Mr. Rothwell.

121, 122 **THE ROMANTIC PERIOD** Mr. Jones, Mr. Stanton.

133, 134 **THE DEVELOPMENT OF AMERICAN LITERATURE** The emergence and growth of a national literature. First semester: Colonial times to the Civil War; second semester: from the Civil War to the present. Mr. Poger and Mr. Shepherd.

135, 136 **CANADIAN LITERATURE** The development of a national literature. Required of students in the Canadian Area Studies Program. Mrs. Thompson.

138 **MODERN BRITISH NOVEL** Mr. Stanton.

140 **MODERN SHORT FICTION** Mr. Cochran, Mr. Gutman, Mr. Jones, and Mr. Shepherd.

141 **MODERN AMERICAN NOVEL** American novelists from 1915 to 1945. Mr. Biddle, Mr. Cochran, Mr. Eschholz, Mr. Gutman, Mr. Poger, Mr. Shepherd.

142 **CONTEMPORARY AMERICAN NOVEL** Significant American novelists since 1945. Mr. Cochran, Mr. Gutman, Mr. Shepherd.

143 **LITERATURE OF BLACK AMERICA** Poetry, fiction, and drama by black writers since the turn of the century. Mr. Gutman, Mr. Orth.

151 PHILOSOPHY AND LITERATURE See Philosophy.

159 CONTEMPORARY AMERICAN POETRY American Poetry since 1950. Ms. Edwards.

161 UTOPIAN AND ANTI-UTOPIAN FICTION Themes and literary characteristics of selected English and American utopias and dystopias from the Renaissance to the present. Mr. Bogorad.

162 WOMEN IN LITERATURE Consideration of the changing roles of women through examination of the images, archetypes, and stereotypes of women characters in selected literary works, primarily British and American. Mrs. Clark.

177, 178 ADVANCED WRITING Students follow their own interests in the writing of poetry and fiction. Permission of instructor required. *Prerequisite:* 53. Mr. Broughton, Mr. Huddle.

182 SEMINAR FOR PROSPECTIVE TEACHERS OF ENGLISH Grammar and language; literary interpretation and criticism; allied problems useful to teachers of English. *Prerequisite:* 50, 261. Mr. Biddle, Mr. Stanton.

192 MAJOR TOPICS IN ENGLISH AND AMERICAN LITERATURE Studies in literary figures, periods, movements, ideas and genres. Primarily for English Majors. *Prerequisites:* junior standing and English Major. Seminars limited to 15 students. Staff. Departmental permission required.

193, 194 COLLEGE HONORS Departmental Permission required. Not to exceed 3 hours per semester.

195, 196 SPECIAL TOPICS Not to exceed 3 hours per semester.

197, 198 READING AND RESEARCH Departmental Permission required. Not to exceed 3 hours per semester.

Unless otherwise indicated, the prerequisite for any course numbered 199 to 229 is six hours of English and Junior standing.

200 OLD ENGLISH The sounds, words, and structure of Old English; simple prose texts and selections from *Beowulf*. Mr. Dickerson. Alternate years, 1975-76.

202 MEDIEVAL LITERATURE The forms (in translation) of medieval literature, with emphasis on Arthurian materials. Mr. Stephany.

204 MIDDLE ENGLISH Literary, historical, and linguistic considerations of Middle English texts, excluding Chaucer. Mr. Dickerson. Alternate years, 1974-75.

205, 206 ENGLISH DRAMA TO THE CLOSING OF THE THEATRES First Semester: From the drama in the Middle Ages to Marlowe and Jonson. Second Semester: Jacobean Drama (exclusive of Shakespeare), to include Webster, Tourneur, and Ford, to the closing of the Theatres in 1642. Mr. Howe, Mr. Rothwell.

209, 210 ELIZABETHAN PROSE AND POETRY The major writers of the Tudor and Stuart periods. Mr. Long. Alternate years, 1975-76.

212 MILTON *Paradise Lost*, *Paradise Regained*, *Samson Agonistes*, some minor poems, and selected prose works. Mr. Bogorad.

217 RESTORATION AND EIGHTEENTH-CENTURY DRAMA Development of English drama from Dryden to Sheridan. Mr. Bogorad, Mr. Howe, Mr. Seid. Alternate years, 1974-75.

218 RESTORATION AND EIGHTEENTH-CENTURY PROSE AND POETRY Significant writers from Dryden to Johnson. Mr. Bogorad. Alternate years, 1974-75.

227, 228 ENGLISH NOVEL English fiction from its origin through the nineteenth century. Mrs. Hall, Mr. Stanton.

231, 232 VICTORIAN LITERATURE Significant writers from 1832 to 1900. Mr. Long. Alternate years, 1974-75.

235 MODERN BRITISH DRAMA British and continental plays of the 19th and 20th centuries. Staff.

236 MODERN AMERICAN DRAMA Recent and contemporary. Mr. Orth.

239 MODERN BRITISH POETRY Mr. Poger.

242 LITERATURE OF THE SOUTHERN RENAISSANCE Selected short stories, novels, and poetry by Glasgow, Faulkner, Warren, Tate, Styron, and others. Mr. Shepherd. Alternate years, 1975-76.

244 MODERN IRISH LITERATURE Irish literature from 1890 to the present. Mr. Bradley. Alternate years, 1975-76.

251, 252 AMERICAN NOVEL OF THE NINETEENTH CENTURY First semester: Hawthorne, Melville, and others; second semester: Twain, Howells, James and others. Mr. Biddle, Mr. Eschholz, Mr. Shepherd.

253 AMERICAN COLONIAL LITERATURE Intellectual and literary origins, in the seventeenth and eighteenth centuries, of American culture. Mather, Taylor, Edwards, Franklin, Jefferson, Freneau and Brown. Mr. Rosa.

254 EMERSON, THOREAU AND THEIR CIRCLE Mr. Orth. Alternate years, 1975-76.

256 REGIONAL WRITING IN AMERICA Selected works by Cooper, Harte, Garland, Twain, Faulkner, and others, including units on local color and Southwest humor. Mr. Cochran. Alternate years, 1974-75.

257 AMERICAN POETRY TO WORLD WAR I Major American poets to 1917, including Poe, Whitman, Dickinson, and others. Mr. Cochran.

258 MODERN AMERICAN POETRY Major American poets from World War I to 1950. Ms. Edwards, Mr. Poger.

261 STRUCTURE OF THE ENGLISH LANGUAGE Descriptive study of Modern American English. Mrs. Clark.

262 HISTORY OF THE ENGLISH LANGUAGE The principles of historical linguistics and their application to English. Mrs. Clark. Alternate years, 1974-75.

264 ENGLISH STYLISTICS Introduction to English stylistics through consideration of changing conceptions of style, evaluation of selected methods of stylistic analysis, and comparison of various literary styles. Mrs. Clark. Alternate years, 1975-76.

266 AMERICAN ENGLISH DIALECTS The emergence of American English with special attention to dialectology. *Prerequisites:* English 13, Linguistics 101 or by permission of the Instructor. Mr. Eschholz.

273 TECHNIQUE AND CRITICISM OF POETRY Intensive analysis of various kinds of poetry to develop appropriate critical methods and standards. Mr. Bogorad.

275 HISTORY OF CRITICISM Principles and theories of criticism from Aristotle to the twentieth century. Mrs. Hall, Mr. Stanton. Alternate years, 1975-76.

276 CONTEMPORARY CRITICISM Mr. Poger.

278 MODERN TRADITION Special topics necessary for the understanding of the critical, intellectual and literary works of the modern period: Symbolism, Realism, Self-consciousness, Nature, the Unconscious, Myth and others. Mr. Poger, Mr. Gutman.

Environmental Studies

COLLEGE OF ARTS AND SCIENCES

COLLEGE OF AGRICULTURE

COLLEGE OF EDUCATION AND SOCIAL SERVICES

SCHOOL OF NATURAL RESOURCES

SCHOOL OF HOME ECONOMICS

Professors Reidel (Director), Wilms; Associate Professor Wagner; Assistant Professor Worley; Instructor Hudspeth.

1 INTRODUCTION TO ENVIRONMENTAL STUDIES The ecological, economic, political-legal, social-psychological, aesthetic, and technological ramifications of environmental problems and issues from an interdisciplinary perspective. Three hours. Reidel, Hudspeth, and Worley.

2 This is a cross-listing designation for several courses in various undergraduate colleges which provide a more focused follow-up to E.S. 1, and an introduction to a particular discipline or professional field with emphasis on study of the environment, selected in consultation with faculty adviser.

51 MAJOR SEMINAR An analysis of environmental problems from the perspectives of various academic disciplines and professional fields with emphasis on interdisciplinary problem solving and research. *Prerequisite:* E.S. 1; Major in Environmental Studies. Permission of instructor. Three hours. Reidel.

100 ENVIRONMENTAL THEORY A comparative analysis of emerging concepts of man/environment relationships; the history, philosophy, and theoretical framework of environmental studies. *Prerequisites:* E.S. 1; Sophomore standing. Three hours. Reidel, Worley.

191 ENVIRONMENTAL PRACTICUM Individual field projects under direction of a faculty member. Research, creative projects, internships. Credit arranged. *Prerequisite:* Permission of Environmental Program. Hudspeth.

195, 196 SPECIAL TOPICS

201 RESEARCH SEMINAR Planning, design, and methods of research for the study of environmental problems. Open to junior majors in environmental studies. *Prerequisites:* E.S. 51, 100. Three hours. Reidel and Wagner.

202, 203 SENIOR PROJECT AND THESIS Individual research under staff direction. *Prerequisite:* E.S. 201, permission of Environmental Program, Major in Environmental Studies. Credit arranged. Staff.

204 SEMINAR IN ENVIRONMENTAL STUDIES Review and discussion of current environmental research and literature. *Prerequisite:* E.S. 100, senior standing, Major or Coordinate-Major in Environmental Studies. Three hours. Wagner and Staff.

Extra-Departmental Courses

COLLEGE OF AGRICULTURE

Environmental Quality

195 ADVANCED ENVIRONMENTAL QUALITY Analysis of problems of the environment; solutions; practical methods; problem solving mechanisms and decision making; theoretical, technological, and sociological influences. Integrated treatment through an interdisciplinary approach. *Prerequisite:* Senior standing or permission of the instructor. Three hours. Staff.

Agricultural Honors

194 AG HONORS Designed to help the superior student gain experience in the area of research and independent study. *Prerequisites:* Permission of College Honors Committee and junior standing. Credit as arranged. Staff.

COLLEGE OF ARTS AND SCIENCES

Chemistry

7 EARTH, AIR, FIRE AND WATER (3-3) See course description under Chemistry, page 177.

General Literature

61, 62 GERMAN LITERATURE IN TRANSLATION Lectures on the development of German literature; reading and discussion of representative works in English translations. No knowledge of German required. *Prerequisite:* sophomore standing and one year course in any literature. Three hours. Miss Richel.

81, 82 RUSSIAN LITERATURE IN TRANSLATION First semester: Russian masters of the nineteenth century. Second semester: twentieth century writers from the symbolists to the present. *Prerequisite:* sophomore standing and one year course in any literature. Three hours. Mr. Nalibow.

151, 152 DEVELOPMENT OF PROSE FICTION First semester: Latin, Spanish, French; second semester: French, Russian, English, and Italian. Three hours.

Linguistics

101, 102 An introductory course designed to acquaint the student with the methods and theory of systematic observation and explanation of language phenomena (linguistics). *Prerequisite*: 101 for 102. Three hours.

Meteorology

161 **INTRODUCTORY METEOROLOGY** An introductory study of weather elements and the dynamic process under which they combine and act. Special consideration of the interaction of earth and atmosphere. *Prerequisite*: mathematics 11; a year of college chemistry (1-2), geology, or physics. Three hours. Mr. Vollkommer.

**COLLÈGE OF ENGINEERING,
MATHEMATICS AND BUSINESS ADMINISTRATION**

Engineering

1 **ENGINEERING DESIGN CONCEPTS I (2-3)** Introduces the student to the various engineering disciplines by lectures and case studies, and to engineering design by direct student involvement in engineering problem solving. The relationship of engineering to contemporary societal needs is strongly stressed. Open to all students. Three hours.

2 **ENGINEERING DESIGN CONCEPTS II (1-3)** Emphasis is placed on participation in design projects, and on the skills of oral and written presentation. Sketching and engineering drawing are introduced. Two hours.

Technology

7 **MAN'S PLACE IN THE UNIVERSE (1-0)** See course description under Technology, page 294.

51 **TECHNOLOGY AND SOCIETY (3-0)** See course description under Technology, page 295.

52 **TECHNOLOGY AND THE ENVIRONMENT (3-0)** See course description under Technology, page 295.

53 **ENERGY AND THE ENVIRONMENT (3-0)** See course description under Technology, page 295.

54 **OUR ELECTRONIC WORLD (3-0)** See course description under Technology, page 295.

251 **TECHNOLOGY AND SOCIETY SEMINAR (3-0)** See course description under Technology, page 295.

 Forestry

(See NATURAL RESOURCES, page 257)

V Geography

COLLEGE OF ARTS AND SCIENCES

Professors Miles, VanderMeer (Chairman); Associate Professors Barnum, Gade, Lind, Meeks; Assistant Professors Leinbach, McHenry.

Note: The normal introductory sequence is 11, 12 although 14, 12 is a recommended alternative, especially for students in economics and business administration.

11 INTRODUCTION TO HUMAN GEOGRAPHY Basic geographic concepts. The cultural diversity among people as it affects the organization and use of the environment. Required of elementary education students. Three hours. I, II. Staff.

12 WORLD NATURAL ENVIRONMENTS The patterns of man's natural environment with particular attention to land-forms, climate, soil, vegetation and water resources. Three hours. I, II. Staff.

14 INTRODUCTION TO ECONOMIC GEOGRAPHY Elementary spatial models of economic patterns, processes and relationships. Three hours. Mr. Leinbach, Mr. VanderMeer.

33 WORLD GEOGRAPHY Survey of the major regions and nations of the world. Three hours. Staff.

101-109 REGIONAL COURSES The character and development of the contemporary cultural, economic, and political patterns of the area against the background of its physical and resource base. *Prerequisite:* 6 hours in the social sciences and sophomore standing. Three hours each.

101 GEOGRAPHY OF AFRICA Mr. Miles.

102 GEOGRAPHY OF CANADA Mr. Miles.

103 GEOGRAPHY OF USSR Mr. Meeks.

105 GEOGRAPHY OF EUROPE Mr. Barnum.

106 GEOGRAPHY OF LATIN AMERICA Mr. Gade.

107 GEOGRAPHY OF THE UNITED STATES Mr. Meeks.

108 GEOGRAPHY OF EAST ASIA Mr. VanderMeer.

109 GEOGRAPHY OF SOUTH ASIA Mr. Linbach.

151 CLIMATOLOGY Elements of weather and climate, and their interaction with one another to produce world climate patterns. Daily weather analysis to facilitate understanding of various climatic systems. *Prerequisite:* sophomore standing. Three hours. Mr. Lind.

161 REMOTE SENSING OF ENVIRONMENT Geographic analysis and evaluation of aerial imagery produced by remote sensors and its relationship to environmental problems in the social and physical sciences. Laboratory sessions involve earth satellite and aircraft imagery. *Prerequisite:* sophomore standing or permission of the instructor. Three hours. Mr. Lind.

171 CARTOGRAPHY Introduction to maps and map preparation, principles of map construction, kinds of information suitable for map presentation, tech-

niques of map drawing, methods of map reproduction, graphs and frequency distributions. *Prerequisite*: sophomore standing. Three hours. I, II. Mr. Barnum.

180 CULTURAL ECOLOGY (Same as Anthropology 180) Interrelationships of social groups and their natural environments and resource bases, with primary emphasis on non-industrial cultures. Empirical and theoretical materials from hunting-gathering, pastoral and peasant peoples will be examined from the perspectives of anthropology and geography. *Prerequisites*: Anthropology 21 or Geography 11. Three hours. Mr. Pastner (Anthropology) and Mr. Gade.

193, 194 COLLEGE HONORS

195, 196 SPECIAL TOPICS

197, 198 READINGS AND RESEARCH

201 HISTORICAL GEOGRAPHY OF THE UNITED STATES (Same as History 201) The physical setting of the American historical development, emphasizing the sequence of peoples and cultures which have occupied the land and their varied appreciation of its resource base. *Prerequisite*: a course in U.S. history plus 3 additional hours in geography, history, or other social science. Three hours. Mr. Miles.

202, 203 HISTORICAL GEOGRAPHY OF EUROPE (Geography 202 same as History 202) European geography within a framework of past times, the historical development and distribution of settlement, economic and political patterns. *Prerequisite*: 6 hours in geography or history. Three hours. Mr. Barnum.

211 GEOGRAPHIC ANALYSIS OF VERMONT A course emphasizing field studies, using the state and local area as an outdoor laboratory to indicate lines of geographic inquiry and to demonstrate methods and techniques of investigation into the human use of the earth. *Prerequisite*: 6 hours in geography. Three hours. Staff.

216 BIOGEOGRAPHY Processes and patterns of distribution, domestication and human utility of plant and animal species and communities in varying environmental and historical contexts. *Prerequisite*: 9 hours in geography or biology. Three hours. Mr. Gade.

220 SEMINAR IN ENVIRONMENTAL GEOLOGY (See Geology 220)

221 SPECIAL TOPICS IN REGIONAL GEOGRAPHY Specialized study of a particular region or parts thereof. *Prerequisite*: 12 hours in the social sciences including 3 in geography and departmental permission. Three hours. Staff. I, II

231 PHYSICAL AND RESOURCE GEOGRAPHY OF THE UNITED STATES Identification and analysis of the natural regions of the U.S. as they reflect the elements of the physical environment. Emphasis on distributional patterns and resource significance. *Prerequisite*: 6 hours in geography including Geography 12. Three hours. Mr. Meeks.

233 REGIONAL PLANNING (See Resource Economics 233)

241 ADVANCED PHYSICAL GEOGRAPHY Geographic patterns and processes in the linkages and interactions between the earth, atmosphere, hydrosphere and biosphere. The effects of human intervention in environmental systems. *Prerequisite*: Geography 12 or 151, and advanced courses in geography, geology, or biological sciences; or permission of the instructor. Three hours. Mr. Lind.

243 SPATIAL ANALYSIS (Same as Resource Economics 243) The analysis of spatial pattern and interaction in geography through quantitative models. An

introduction to measurement, sampling and covariation within a spatial framework. *Prerequisites*: 6 hours in geography or other social sciences. Three hours. Mr. Leinbach.

244 SPATIAL ANALYSIS The analysis of spatial pattern and interaction in geography through quantitative models. The utility of probabilistic, normative and multivariate models in analyzing problems of spatial structure and process; emphasis upon spatial diffusion, regional classification and programming, spatial forecasting and decision making. *Prerequisite*: Geography 243. Three hours. Mr. Leinbach.

246 URBAN GEOGRAPHY An analysis of the morphology and function of cities. Consideration of urban growth and development, methods of classification, distribution, and theories of location. *Prerequisite*: Geography 11 and 3 additional hours in the social sciences. Three hours. Mr. Barnum.

247 TRANSPORTATION FLOWS AND NETWORKS The growth, location, and structure of transportation networks. An examination of spatial flows and linkage patterns, development, and connectivity through analytical, descriptive, and theoretical models. *Prerequisite*: 6 hours in geography or other social sciences. Three hours. Mr. Leinbach.

282 LOCATIONAL ANALYSIS OF INDUSTRY Factors in and examples of the regional location of manufacturing; classical and contemporary theories of location and measurement of spatial change in secondary structure. Locational planning in developed and developing areas. Emphasis on problems of regional disequilibrium and growth strategies through case studies in Anglo and Latin America, Europe, Africa, and South Asia. *Prerequisite*: 6 hours in geography or other social sciences. Three hours. Mr. Leinbach.

249 AGRICULTURAL GEOGRAPHY Analysis of world, national, and local rural land use patterns. Landscape elements as they reflect prevailing and historic agricultural patterns. Ecologic and social problems of modern agriculture. *Prerequisite*: 6 hours in geography or other social sciences. Three hours. Mr. Meeks, Mr. VanderMeer.

251 ADVANCED CLIMATOLOGY Analysis of regional and local climatic data with special reference to climatic controls; special laboratory projects. *Prerequisite*: Geography 151 and permission of the instructor. Three hours. Mr. Lind.

257 POLITICAL GEOGRAPHY (Same as Political Science 257) The political unit as a geographic area. Location, resources, and the distributional relationships of the variety of cultural or human factors as they have a bearing on the structure and functioning of the modern political unit. Relationship between geopolitics and political geography. *Prerequisite*: six hours in geography and political science. Three hours. Mr. Miles.

261 REMOTE SENSING AND ENVIRONMENTAL PROBLEMS (Same as Geology 219). Advanced research projects in remote sensing involving use and application of multi-spectral data for environmental studies. *Prerequisite*: Geography 161 or permission of the instructor. Three hours. Mr. Lind.

262 CULTURAL GEOGRAPHY (Same as Anthropology 262) Concepts and theories of cultural ecology, culture area, culture history and the cultural landscape. *Prerequisites*: Geography 11 and 6 additional hours in geography, anthropology or other social sciences. Three hours. Mr. Gade.

263 MAN IN NATURE An inquiry into the changing conceptions of the earth as the home of man, and the conservative and destructive uses of the physical

environment that have resulted from these attitudes. *Prerequisite:* 3 hours of geography. Three hours. II. Mr. Gade.

264 **MAN, SPACE AND COMMUNITY** Social geography; an interpretation of the social nature of place and the spatial character of social phenomena and groups; origins and dispersals, distributions, boundaries, and territoriality at community, regional and national scales. *Prerequisite:* 6 hours in geography or other social sciences. Three hours. Mr. McHenry.

271 **ADVANCED CARTOGRAPHY** The history and importance of cartography; contemporary developments; special laboratory projects. *Prerequisite:* Geography 171 and permission of the instructor. Three hours. I, II. Mr. Barnum.

281 **THE NATURE OF GEOGRAPHY** The history, philosophy and structure of modern geography. *Prerequisite:* 12 hours in geography. Three hours. I. Staff.

295, 296 **SEMINAR** Selected topics in geography. *Prerequisite:* 6 hours in geography. Three hours. Staff.

297, 298 **SPECIAL TOPICS**

V Geology

COLLEGE OF ARTS AND SCIENCES

Professors Hunt and Stanley (Chairman); Associate Professors Drake and Wagner; Assistant Professors Bucke, Doolan, and Rhodes.

1 **INTRODUCTORY GEOLOGY (3-2)** Processes, agents, and their effects on materials, structure, and morphology of Earth's crust. Laboratory includes field trips, study and interpretation of rocks, minerals, and maps. Four hours. Mr. Bucke.

25 **ELEMENTARY FIELD GEOLOGY (1-9)** Introduction to problem oriented geologic mapping with emphasis on such environmental problems as water and mineral resources, land usage, and geologic hazards. *Prerequisite:* None. Four hours. Staff.

32 **HISTORY OF THE EARTH (3-0)** Origin of the earth and solar system; evolution of the earth's continents, oceans, and atmosphere; the effects of changing ancient environments. Three hours. Mr. Bucke, Mr. Hunt.

42 **GEOLOGICAL OCEANOGRAPHY (3-0)** Characteristics and development of oceans, their basins and shorelines. Continental drift and related investigations. *Prerequisite:* 1 or introductory science course. Three hours. Mr. Hunt, Mr. Doolan.

51 **ENVIRONMENTAL GEOLOGY (3-0)** Environmental topics to include water resources, waste disposal, pollution, land planning and development, highways, rivers, and shorelines. *Prerequisite:* 1 or introductory courses in science, engineering, or permission of instructor. Three hours. Mr. Wagner.

60 **GEOLOGY OF MINERAL RESOURCES (2-3)** The origins, forms, and classifications of mineral deposits. The world location, occurrence and production of major mineral products. Three hours. Mr. Drake.

110 **EXTRATERRESTRIAL GEOLOGY (3-0)** The geology of extraterrestrial bodies, with emphasis on lunar materials and meteorites. *Prerequisite:* 1. Three hours. Mr. Drake.

111 **INTRODUCTORY MINERALOGY (2-6)** Study of the chemical and physical properties of minerals with special regard to their mode of origin. Laboratory stresses identification of minerals in hand specimen. *Prerequisite:* 1, 42, or introductory courses in physics, or chemistry. Four hours. Mr. Drake.

121 **GEOLOGIC HISTORY OF LIFE (3-0)** Survey of the origin, preservation, and diversification of ancient life. The interaction of organisms with their environment and the effect that organisms have had on the evolution of the earth. *Prerequisite:* 1, 42, or Biology 1, or equivalent. Three hours. Mr. Hunt.

132 **INTERMEDIATE ENVIRONMENTAL GEOLOGY (3-0)** Mechanical, structural, and chemical aspects of rocks and their application to man's use of the earth. Emphasis on technical evaluation of earthquake hazards, mineral, petroleum, and groundwater resources, highway and dam construction, land development, etc. *Prerequisite:* 1, 51, or introductory courses in physics, chemistry, engineering, or permission of instructor. Three hours. Mr. Stanley.

145 **OPTICAL MINERALOGY (1-6)** The study of the optical properties of minerals by means of the polarizing microscope with emphasis on determinative techniques. *Prerequisite:* 111 (may be taken concurrently). Three hours. Mr. Doolan.

155 **SEDIMENTARY PETROLOGY (1-6)** Origin, identification, and basis for classification of sedimentary rocks, with emphasis on interpretation of depositional and post-depositional environments. *Prerequisite:* 111. Three hours. Mr. Bucke.

156 **IGNEOUS AND METAMORPHIC PETROLOGY (2-3)** The origin and analysis of igneous and metamorphic rocks. Laboratory stresses modern approaches to petrologic problems. *Prerequisite:* 145. Four hours. Mr. Doolan.

166 **STRUCTURAL GEOLOGY (3-3)** Rock deformation, description, and geometry of structural types, and the kinematic and dynamic interpretation of structural features of all sizes. *Prerequisite:* 1, or 42, 51, 132, or Physics 16, 25, or C.E. 100, 180. Four hours. Mr. Stanley.

180 **SOIL MECHANICS** (See Civil Engineering 180). Four hours. Mr. Olson.

193, 194 **COLLEGE HONORS**

195, 196 **SPECIAL TOPICS**

197, 198 **RESEARCH IN GEOLOGY (0-2)** Supervised research and readings in a selected field of geology. Students from the allied sciences, mathematics, and engineering may elect a research problem that combines their major field of study and geology. *Prerequisite:* Consultation with the staff. Three hours.

215 **GEOMORPHOLOGY** Examination of stream, wind, glacier, and wave mechanics and the resultant land forms. Emphasis is given to recent field and laboratory studies. *Prerequisite:* 51 or permission of instructor. Three hours. Mr. Rhodes.

216 **GLACIAL GEOLOGY (2-3)** The Quaternary history of North America with emphasis on the origin, mechanics, and effects of past and present glaciations. *Prerequisite:* junior standing or above. Three hours. Mr. Wagner.

218 **HYDROGEOLOGY (3-0)** The origin, occurrence, movement, and character of ground water. *Prerequisite:* junior standing or above. Three hours. Mr. Rhodes. Alternate years.

219 **REMOTE SENSING OF THE ENVIRONMENT** (See Geography 261). Three hours. Mr. Lind.

220 **SEMINAR IN ENVIRONMENTAL GEOLOGY (2-3)** Consideration of environmental problems in Vermont, New England, and elsewhere with emphasis on the geological role in the solution of these problems. *Prerequisite:* 51, 132, or permission of instructor. Three hours. Staff.

221 **SOIL CLASSIFICATION AND LAND USE** (See Plant and Soil Science 261). Three hours. Mr. Bartlett.

223 **ENVIRONMENTAL GEOLOGY ACTIONS STUDIES** Study of environmental problems. Emphasis is given to project selection, investigation methods, actual investigation, and constructive implementation of findings for maximum social benefit. *Prerequisite:* permission of instructor. Offered during summers. Three to six hours. Mr. Wagner.

235 **ADVANCED STRUCTURAL GEOLOGY (2-3)** Dynamic and kinematic origin of earth structures with emphasis on field studies, rock mechanics and other laboratory experiments. *Prerequisite:* 166. Three hours. Mr. Stanley.

237 **STRUCTURAL PETROLOGY (3-0)** Modes of rock deformation. Dynamic and kinematic interpretation of strain features in minerals. Laboratory includes orientation and universal stage procedures, use of computers in the presentation of data, and methods of interpretation. *Prerequisite:* 66 and 145. Three hours. Mr. Stanley.

238 **FIELD GEOLOGY (1-6)** Field mapping in western Vermont. Methods of analysis of field data. Geological reports. Held in late May and early June. *Prerequisite:* 166 or departmental permission. Four hours. Mr. Stanley.

242 **REGIONAL GEOLOGY (3-0)** The geology and sequential development of selected regions of the earth's crust with emphasis on plate tectonics. *Prerequisite:* 155 or 156 (or concurrent enrollment), 166. Three hours. Mr. Stanley.

245 **GEOLOGY OF NEW ENGLAND (3-0)** *Prerequisite:* 166, or 155, 156, or 277. Three hours. Mr. Stanley.

250 **ADVANCED MINERALOGY (2-3)** Crystallographic, chemical, and physical properties of the common rock forming minerals. Laboratory stresses techniques of mineral identification and analysis of mineral assemblages. *Prerequisite:* 111. Three hours. Mr. Drake.

252 **CLAY MINERALOGY** The structure, composition, properties, occurrence, origin, distribution, and environmental significance of the various clay minerals. Laboratory techniques in identification of clay minerals and measurement of their physical and chemical parameters. *Prerequisite:* Permission of instructor. Three hours. Mr. Bucke.

253 **PHASE EQUILIBRIUM IN MINERAL ASSEMBLAGES (2-3)** The application of thermodynamics and graphical methods to analysis of multicomponent, poly-phase systems of mineralogical interest. *Prerequisite:* 250, or 156, or permission of instructor. Three hours. Mr. Drake.

254 **GEOCHEMISTRY (3-0)** The application of basic concepts in chemistry to geological problems, including solution geochemistry, weathering, mineral

paragenesis, and the effects of pressure and temperature. *Prerequisite:* 250, or 155, or 156, or permission of instructor. Three hours. Mr. Drake.

256 CRYSTAL CHEMISTRY (2-3) A discussion of crystal symmetry, polymorphism, order-disorder, cation distribution and chemical variation in mineral systems and the genetic significance thereof. *Prerequisite:* 111 and Chemistry 1-2 or permission of instructor. Three hours. Mr. Drake.

261 IGNEOUS GEOLOGY Paragenesis of igneous rocks; laboratory work on selected suites of specimens. *Prerequisite:* 145, 156. Three hours. Alternate years. Mr. Doolan.

264 METAMORPHIC GEOLOGY The origin of metamorphic rocks with emphasis on the concepts of metamorphic facies, analysis and interpretation of mineral assemblages, and the spacial relationship of metamorphism to tectogenesis and plate tectonics. *Prerequisites:* 145, 156. Three hours. Alternate years. Mr. Doolan, Mr. Drake.

270 INVERTEBRATE PALEONTOLOGY (2-3) Classification, geological distribution, evolution, paleoecology, and morphology of major invertebrate fossil groups. *Prerequisite:* 121, or equivalent. Three hours. Mr. Hunt.

272 RECENT SEDIMENTATION (1-6) Investigation of recent sedimentary environments using geolimnological and oceanographic techniques. Group and individual projects. Field oriented with use of the University research boats. *Prerequisite:* 155 or 42 and permission of instructor. Three hours. Mr. Hunt.

277 STRATIGRAPHY (2-2) Study and interpretation of development and distribution of sedimentary rocks. *Prerequisite:* 155. Three hours. Mr. Bucke.

278 ADVANCED SEDIMENTARY PETROLOGY Origin and interpretation of sedimentary rocks. Topics include mechanics of transportation and desposition, recent depositional environments, interpretation of surface textures, methods of statistical analysis, theoretical aspects of rock classification, and sedimentary tectonics. Thin section study and individual projects. *Prerequisite:* 155. Three hours. Mr. Hunt.

291 SEMINAR IN GEOLOGY Selected topics of current interest. *Prerequisite:* senior or graduate standing. One to three hours. Staff.

German

COLLEGE OF ARTS AND SCIENCES

Professor Webster (Chairman); Associate Professors Kahn and Richel; Assistant Professors Allen, Mieder and Scrase.

1-2 ELEMENTARY GERMAN Four hours. Staff.

11, 12 INTERMEDIATE GERMAN Literature and Discussion of selected prose with review of grammar. *Prerequisite:* 1-2 or equivalent for 11; 11 for 12. Three hours. Mr. Webster.

13, 14 INTERMEDIATE GERMAN Composition and Conversation. Guided conversation, discussion and written work leading to free composition and oral presentations. Grammar review. *Prerequisite:* 13 or 11 for 14. Three hours. Mr. Kahn and Staff.

15, 16 INTERMEDIATE GERMAN Introduction to Technical German. Reading technical expository prose of moderate difficulty. Emphasis on developing fluency in reading types of prose useful for graduate work and research in the humanities and sciences. *Prerequisite:* 1-2 or equivalent; 15 for 16. Three hours. Mr. Mieder.

101, 102 INTRODUCTION TO GERMAN LITERATURE Survey of German literature from the beginnings to the twentieth century. *Prerequisite:* 12 or 14 or equivalent. Three hours. Mr. Webster.

121, 122 COMPOSITION AND CONVERSATION Emphasis on increasing oral and written command of the language. Free composition, oral reports, and translation into German. *Prerequisite:* 12 or 14 or equivalent and departmental permission. Three hours. Staff.

193, 194 COLLEGE HONORS

195, 196 SPECIAL TOPICS Advanced study in accordance with students' needs and interests. *Prerequisite:* 101, 102 or the equivalent and departmental permission. Three hours. Staff.

197, 198 READINGS AND RESEARCH

201 PROSEMINAR: METHODS OF RESEARCH AND BIBLIOGRAPHY An introduction to tools and methods of research. *Prerequisite:* 101, 102 or equivalent. Three hours. Mr. Mieder.

203 DEVELOPMENT OF GERMAN INTELLECTUAL MOVEMENTS A comprehensive survey of the history of ideas as a framework for the study of German literature. *Prerequisite:* 101, 102 or equivalent. Three hours. Mr. Allen.

204 COURTLY EPIC AND MINNESANG Cultural background and major works of medieval classicism. *Prerequisite:* 101, 102 or equivalent. Three hours. Mr. Mieder.

205, 206 GOETHE AND SCHILLER AND THEIR TIME Origin, development, characteristics and criticism of German Classicism. *Prerequisite:* 101, 102 or equivalent. Three hours. Mr. Webster and Staff.

207 NINETEENTH-CENTURY PROSE Narrative prose of representative authors such as Mörike, Keller, Ludwig, Meyer, Stifter, Raabe, and the early Thomas Mann. *Prerequisite:* 101, 102 or equivalent. Three hours. Staff. Alternate years, 1974-75.

208 NINETEENTH-CENTURY DRAMA Works by Kleist, Büchner, Grillparzer, Hebbel, Ludwig, Wagner and the early Hauptmann. *Prerequisite:* 101, 102 or the equivalent. Three hours. Staff. Alternate years, 1974-75.

209, 210 THE TWENTIETH CENTURY Selected works in poetry, prose and drama by Brecht, George, Hauptmann, Hofmannsthal, Kafka, Thomas Mann, Rilke and others. *Prerequisite:* 101, 102 or the equivalent. Three hours. Mr. Allen. Alternate years, 1975-76.

221, 222 ADVANCED COMPOSITION AND CONVERSATION Oral and written practice in German of advanced difficulty with emphasis on stylistics. *Prerequisite:* 121, 122 or equivalent. Three hours. Mr. Kahn.

232 HISTORY OF THE GERMAN LANGUAGE Historical linguistic development of the German language from earliest times to the present. No knowledge of the older stages of the language is presupposed or required. *Prerequisite:* 121, 122 or equivalent. Three hours. Mr. Mieder. Alternate years, 1975-76.

281, 282 SENIOR SEMINAR Readings and research. Required of all senior concentrators. Three hours.

General Literature

61, 62 GERMAN LITERATURE IN TRANSLATION See course description under Extra-Departmental Courses, page 220.

Hebrew

COLLEGE OF ARTS AND SCIENCES

Associate Professor Kahn

1-2 ELEMENTARY HEBREW The spoken language of everyday use with oral, aural and written practice in speaking, reading, and comprehension. Four hours. Mr. Kahn.

11, 12 INTERMEDIATE HEBREW Reading, translation, and discussion in Hebrew of texts selected to show the development of Hebrew culture from Biblical times to the present. Three hours. Mr. Kahn.

History

COLLEGE OF ARTS AND SCIENCES

Professors Bliss, Daniels, Davison, Evans (Emeritus), Felt, Hand (Chairman), Metcalfe, Rollins, Schmokel, Schultz, Spinner and Stout; Associate Professors Hutton, Muller, Overfield, Seybolt, and Steffens; Assistant Professors Andrea, Stoler, True and Young; Instructors Bertley, Engroff, K. Felt, Jackson.

Courses numbered 100 to 199 generally require sophomore standing, but may be open to freshmen by permission of the instructor. Courses numbered 200 to 299 require six hours of appropriate work in history.

1, 2 CONTEMPORARY PROBLEMS IN HISTORICAL PERSPECTIVE An introduction to historical thinking and literature focusing upon significant historical antecedents of such selected facets of contemporary civilization as urbanization, race, bureaucracy, revolution, science and technology. Three hours. Staff.

3 THE STUDY OF HISTORY An introduction to the methods of studying the past. Use of the works of major historians as a means of investigating the ways in which historians think about and write history. Three hours. Staff.

9 ANCIENT MEDITERRANEAN CIVILIZATION A detailed study of Athens in the 5th century B.C. continuing to the rise of Rome through the 1st century A.D. (Students who have already taken History 106 may not take History 9). Three hours. Mr. Bliss and Staff.

10 MEDIEVAL EUROPEAN CIVILIZATION Three hours. Mr. Andrea.

11 **EUROPEAN CIVILIZATION TO 1815** An introduction to the political, social, and intellectual movements which have shaped the foundations of western civilization: from the Renaissance to the French Revolution. Three hours. Staff.

12 **EUROPEAN CIVILIZATION, 1815 to 1945** A survey emphasizing the ideas and institutions which have helped shape western society and culture from the Napoleonic Era to the end of the Second World War. Three hours. Staff.

23, 24 **HISTORY OF THE UNITED STATES** Three hours. Staff.

51, 52 **WORLD HISTORY SINCE 1945** First semester, the Soviet Union, Eastern Europe, Western Europe, and the United States; second semester, Asia, Africa, and Latin America. Three hours. Mr. Spinner.

61, 62 **HISTORY OF SCIENCE** A survey of the history of the physical and biological sciences from antiquity to the present. The course will stress science as an intellectual activity, within the contemporary context of philosophy, religion and social organization. Three hours. Mr. Steffens.

73 **TRADITIONAL CHINESE CIVILIZATION** An examination of the thought, social structure, politics, economics, science, literature, art and music of traditional China. (No prerequisites) Three hours. Mr. Seybolt.

74 **HISTORY OF JAPAN** A survey of Japanese political, social, economic and aesthetic thought and institutions from 600 A.D. to the present.

104 **LATIN AMERICAN HISTORY** An introduction to the history of modern Latin America. Three hours. Mr. True.

105 **ARCHAEOLOGY AND HISTORY OF THE ANCIENT NEAR EAST** Survey of the primary civilizations of Egypt and Mesopotamia and the secondary cultures of Anatolia, Syria-Palestine, Assyria, and Iran, with major emphasis on the archaeological evidence. Three hours. Miss Davison.

106 **HISTORY OF GREECE** Survey of the history of ancient Greece from pre-historic times (with special emphasis on the Minoan and Mycenaean cultures) to the Hellenistic Age. Three hours. Miss Davison.

107 **HISTORY OF ROME** Survey of the history of ancient Italy from prehistoric times (with special emphasis on the Italic peoples, the Etruscans, and Greek colonization) to the age of Justinian. Three hours. Miss Davison.

115, 116 **AFRICAN HISTORY** Survey of the history of Africa south of the Sahara, from earliest times to independence. First semester: to 1880; second semester: 1880 to the present. Three hours. Mr. Schmokel.

123 **AMERICAN HISTORY SINCE 1945** Three hours. Mr. Hand.

125 **BLACK HISTORY** Economic, social, political, and intellectual developments in U. S. history as they have affected and been affected by the Black American; emphasis on the period since 1865. Three hours. Staff.

140 **BIOGRAPHY** Readings in the history and criticism of biography, the role of the individual in history, and biographies of individuals. Three hours. Mr. Schultz.

153, 154 **ENGLISH HISTORY** Political and social history of England. First semester: Middle Ages and Tudor-Stuart; second semester: 1715 to the present. Three hours. Messrs. Metcalfe and Spinner. To be given in alternate years, beginning, 1971-1972.

181 **U.S. MILITARY HISTORY** The development of the American Military Establishment within the framework of American history from the Colonial era to the present. Three hours. Messrs. Stoler and Stout.

191 **READINGS FOR DEPARTMENTAL HONORS** For seniors concentrating in history only. (Candidates should consult the chairman of the Department at the time of spring enrollment. Students accepted will do their readings between November and March; official enrollment will be in the spring semester.) *Prerequisite:* an 80 average through the junior year and an 85 average in at least eighteen hours of history; completion of at least six hours of history numbered above 200. Three hours. Staff.

193, 194 **COLLEGE HONORS**

195, 196 **SPECIAL TOPICS**

197, 198 **READINGS AND RESEARCH** An individual instructor may prescribe prerequisites for History 197, 198.

200 **PHILOSOPHY OF HISTORY** An investigation of the theories of history from the perspectives of both historians and philosophers. Three hours. Staff.

201 **HISTORICAL GEOGRAPHY OF THE U.S.** Three hours. See geography 201.

202 **HISTORICAL GEOGRAPHY OF EUROPE** Three hours. See geography 202.

203 **LATIN AMERICAN HISTORY** The Spanish Empire in America including the Indian heritage, the conquest, economic, social and political trends within the empire, and the struggles for independence. Reading knowledge of Spanish strongly recommended. Three hours. Mr. True. (To be given in alternate years, spring semester.)

205 **HISTORY OF MEXICO SINCE 1810** Reading knowledge of Spanish strongly recommended. Three hours. Mr. True. (To be given in alternate years, spring semester.)

207 **THE EARLY MIDDLE AGES** Western Europe from the late Roman Empire to the death of Otto III (A.D. 1002). Three hours. Mr. Andrea.

208 **THE HIGH MIDDLE AGES** Western Europe, 1000-1300. Three hours. Mr. Andrea.

211 **THE RENAISSANCE** European society from the fourteenth to early sixteenth century, emphasizing the transition from medieval to "modern" society and the roots of Renaissance Italy's cultural and artistic brilliance. Three hours. Mr. Overfield.

212 **THE REFORMATION** European society from the Renaissance to mid seventeenth century. Emphasis on the religious struggles growing out of the Protestant Reformation and their impact on the social, political, economic and cultural movements of the era. Three hours. Mr. Overfield.

213, 214 **CANADIAN HISTORY** Canadian development from the French exploration and settlement to the present; evolution of self-government and relations with the United States; historical foundations of the problems of biculturalism. Three hours. Messrs. Metcalfe and Young.

215, 216 **FRENCH CANADA** A history of the French experience in North America from 1608-1867 and 1867-1973. Ability to read in French a decided asset. Three hours. Mr. Young.

221 **THE AMERICAN COLONIES 1607-1763** Three hours. Mr. Stout.

- 222 THE AMERICAN REVOLUTION 1763-1790 Three hours. Mr. Stout.
- 226 THE MIDDLE PERIOD OF U.S. HISTORY History of the U.S., 1815-1856. Three hours. Staff.
- 231, 232 FRENCH HISTORY First semester: seventeenth century to 1799; second semester: 1799 to the present. Three hours. Mr. Hutton.
- 233, 234 GERMAN HISTORY First semester: seventeenth century to 1850; second semester: 1850 to the present. Three hours. Messrs. Overfield and Schmokel.
- 235, 236 INTELLECTUAL HISTORY OF MODERN EUROPE Emphasis upon ideas in their relation to major political and social movements. First semester: Humanism, the Scientific Revolution, and the Enlightenment (1500-1800); second semester: the Modern Era (1800-1960). Three hours. Messrs. Hutton and Overfield.
- 240 AMERICAN BIOGRAPHY Investigation and portrayal of personalities; the uses of biography in the study of American history. Subjects selected to represent a variety of vocations and aspects of history. Three hours. Mr. Schultz.
- 243 SOVIET RUSSIA The USSR from the Revolution of 1917 to the present. Three hours. Mr. Daniels.
- 244 IMPERIAL RUSSIA History of Russia from the Middle Ages to the revolutionary period. Three hours. Staff.
- 253 TUDOR-STUART ENGLAND England from 1485 to 1660, with particular emphasis on the central period from the 1530's to the 1640's (the Henrician reformation to the Revolution). Three hours. Mr. Metcalfe. Offered 1972-1973 and alternate years.
- 254 VICTORIAN ENGLAND Selected topics in 19th century English history with emphasis on "industry and empire," changing class relationships, and the growth and development of political parties. Three hours. Mr. Spinner. Offered 1972-1973 and alternate years.
- 257, 258 AMERICAN STATESMEN Thought and practical politics of American statesmen. First semester: 1783-1865; second semester: since 1865. Three hours. Mr. Schultz.
- 259 THE LINCOLN ERA A history of the United States, 1830-1855, with emphasis on the sectional conflict of the 1850's, the Civil War, and the life of Lincoln. Three hours. Mr. Schultz.
- 261 VERMONT HISTORY A survey of Vermont History from early times to the present. Three hours. Mr. Muller.
- 263, 264 SOCIAL HISTORY OF THE U.S. Selected topics in the history of American society, including social movements, rural history, or urban history. Three hours. Ms. Jackson.
- 265, 266 INTELLECTUAL HISTORY OF THE UNITED STATES Three hours. Mr. Felt.
- 267, 268 HISTORY OF U.S. FOREIGN RELATIONS First semester: 1763-1900; second semester: 1900-present. Three hours. Mr. Stoler.
- 271 MODERN CHINA An examination of Chinese history from 1880 to 1949 including a discussion of Western imperialism, the breakdown of the Confucian order, and the 20th century struggle to find a viable alternative, culminating in the Communist victory of 1949. (Juniors, seniors, and graduate students. No other prerequisites.) Three hours. Mr. Seybolt.

272 **PEOPLE'S REPUBLIC OF CHINA** An examination of the domestic and foreign affairs of China from 1949 to the present.

277 **SOVIET POLITICS** (Same as Political Science 277) An intensive historical and institutional study of the Soviet government and Communist Party, mainly treating the period since 1953. Application of sociological and biographical analysis and data-processing techniques. Comparative treatment of other Communist systems. *Prerequisites:* 6 hours of appropriate work in history, political science, or economics. Three hours. Mr. Daniels.

278 **FOREIGN POLICY OF THE USSR** (Same as political science 278).

280 **SCIENCE AND CULTURE** A study of science as an integral part of the culture of our age with emphasis on the published works of leading scientists, mathematicians and "humanists" of the 20th century. Three hours. Mr. Steffens.

281 **SCIENTIFIC REVOLUTIONS AND SOCIETY** An evaluation of the relationship between scientific activity and conditions of society during the "Scientific Revolution" of the 17th century, the rapid development of science and technology in the 19th century and the "new science" of the 20th century. Three hours. Mr. Steffens.

289 **QUANTITATIVE METHODS IN HISTORICAL RESEARCH** Application of quantitative methods to the selection and analysis of historical source materials; emphasis on political and social data. Use of the University's Computation Center facilities and other data-processing equipment. *Prerequisite:* Math 110 or equivalent work in statistics. Three hours. Ms. Jackson.

Home Economics

SCHOOL OF HOME ECONOMICS

Professors Betsinger (Director), Grams, Williams; Associate Professors Caldwell, Knowles, Powell, Webster; Assistant Professors Atwood, J. Emanuel¹, Goldhaber, Jameson, Livak, Osborn, Prior, Shelton, Soule and Tyzbir; Instructors F. Emanuel², Reidel², and Thorndike; Teaching Associates Lawler, Slazinik; Technologist Hegyi; Adjunct Professors Merrow, Spaven; Affiliated Faculty: Assistant Professor Rathbone.

1 **HOME ECONOMICS IN THE LAND-GRANT COLLEGE** Teaching, research, and extension. Historical development of field, its common core of family and individual, professional opportunities which are available. 1 hour. Staff.

Program in Clothing, Textiles, and Design

15 **DESIGN (I-4)** Color and design in theory and practice. Work with various media for creative expression and understanding of art principles. Three hours. I, II. Misses Atwood and Caldwell.

¹On leave

²Part-time

16 **SKETCHING FOR FASHION AND HOUSING DESIGN (1-4)** Sketching the human figure in poses and in action. Orthographic and perspective drawing. Rendering in various media. *Prerequisite:* 15. Three hours. Miss Atwood and Miss Slazinik.

20 **TEXTILES AND CLOTHING FOR THE CONSUMER (3-0)** Clothing: its impact on wearer and observer. Today's fibers, fabrics and finishes. Consumer problems and responsibilities in selection, use, care. Three hours. I, II. Miss Thorndike.

22 **CLOTHING CONCEPTS AND TECHNIQUES I (1-4)** Basic concepts and skills related to clothing construction. Fabric selection, pattern alteration, and garment construction to meet individual needs. Three hours. Miss Slazinik.

23 **CLOTHING CONCEPTS AND TECHNIQUES II (1-4)** Advanced construction with emphasis on pattern alteration. Techniques used with fabrics which require special handling. Includes current fashion, fabric and related product developments. *Prerequisite:* 22 or instructor approval based on a pretest. Three hours. Mrs. Lawler.

25 **CLOTHING, TEXTILES, AND DESIGN SEMINAR** An integrated look at the professional aspects of Clothing, Textiles and Design. All students in the program enroll for one credit per year. Juniors and seniors may enroll for an additional credit for planning and implementation of the program. *Prerequisite:* Clothing, Textiles and Design majors. Maximum of 6 credits. Staff.

107 **COSTUME DESIGN (1-4)** Application of design fundamentals and principles to fashion planning. Techniques of fashion illustration. *Prerequisites:* 15, 16. Three hours. Miss Caldwell.

114 **WEAVING: SPINNING AND HAND TECHNIQUES (1-4)** An introduction to spinning and weaving with emphasis on hand methods as practiced in past and present cultures. *Prerequisite:* a course in design. Three credits. Miss Atwood.

115 **TEXTILE DESIGN (1-4)** Application of design elements and principles to processes of textile design. The Shelburne Museum collection will provide resources for research. *Prerequisites:* 15, 20; or Art 10 and departmental permission. Three hours. Miss Atwood.

116 **WEAVING (1-4)** Practical application of design fundamentals in the creation of woven textiles. Shelburne Museum collection available for study. *Prerequisites:* 15, 20; or Art 10 and departmental permission. Three hours. Miss Atwood.

117 **HISTORY OF COSTUME (2-2)** History of costume stressing the background, philosophy and events of each period as reflected in dress. *Prerequisites:* Art 5, 6. Three hours. Miss Caldwell.

118 **HISTORY OF TEXTILES (3-0)** Textiles throughout history. Design, production and uses in various periods and societies. Geographic, economic and cultural implications. *Prerequisite:* 20 or permission of instructor. Three hours. Miss Caldwell.

119 **INTERIOR DESIGN I (1-4)** Application of design fundamentals to the problems involved in furnishing the home. *Prerequisite:* 15 (and 16 for Design majors). Three hours. Miss Caldwell.

120-121 **INTERMEDIATE TEXTILES (2-3)** Physical and chemical properties of fibers in relation to fabric characteristics. Technological developments in fabric formation, dyes, finishes. Testing techniques. *Prerequisites:* 20, Chemistry 16. Six hours. Miss Thorndike.

122 **PATTERN DESIGN (2-4)** Techniques of designing and altering flat patterns. Advanced construction techniques, altering flat pattern and emphasis on original design. *Prerequisite:* 23. Three hours. I, II. Mrs. Webster.

123 **TAILORING (2-4)** Construction techniques with emphasis on tailoring problems. *Prerequisite:* 122. Three hours. Mrs. Lawler and Mrs. Webster.

217 **AMERICAN TEXTILES AND FASHION: TWO CENTURIES—18th Century to 1910** Study of home production of textiles, needle art and clothing in collections at Shelburne Museum. Lectures, demonstrations and laboratory experience. *Prerequisite:* six hours in design and/or textiles, or permission of instructors. Three hours. Misses Atwood and Caldwell.

219 **INTERIOR DESIGN II (1-4)** Interior design; period furnishing, its present use and influence upon modern furnishing. *Prerequisite:* 119. Three hours. Miss Caldwell.

221 **COSTUME DESIGN AND DRAPING (1-4)** Draping techniques in creative fashion design. Handling of fabrics in relation to line in dress. Original projects. *Prerequisites:* 15, 122. Three hours. Mrs. Webster.

229 **CLOTHING, TEXTILES AND RELATED ART SEMINAR** Theory and research in Clothing, Textiles and Related Art, analysis of current problems; review and discussion of recent publications; individual studies. *Prerequisites:* 17, 219 or 221. Three hours. Staff.

231 **ADVANCED CLOTHING WORKSHOP AND SEMINAR (2-4)** Individual projects using all possible methods of clothing design. Independent laboratory work. Emphasis on management, planning, new techniques, production, evaluation. *Prerequisites:* 123, 221. Three hours. Mrs. Webster.

Program in Early Childhood and Human Development

61 **HUMAN DEVELOPMENT IN CONTEMPORARY SOCIETY** The impact of the family, community, and various agencies, systems and conditions within society upon the developing individual. Three hours. Mr. Grams.

62 **ADOLESCENT DEVELOPMENT** Physical growth, physiological, psychological, and social development in adolescence. Emphasis on interrelationships of these processes and the developing personality. *Prerequisites:* sophomore standing, psychology 1. Three hours. Mr. Shelton.

63 **CHILD DEVELOPMENT** The biological, psychological, and social growth and development of the child and his relationships with his family, peers and institutions. *Prerequisites:* sophomore standing and psychology 1. Three hours. Ms. Jameson, Mr. Shelton, and Mr. Goldhaber.

64 **MATURING AND AGING** Physical change, physiological, psychological, social development during the maturing years and older age. Interrelationships between these processes will be stressed. *Prerequisites:* sophomore standing, psychology 1. Three hours. Mr. Grams.

✓65 **HUMAN RELATIONSHIPS AND SEXUALITY** Sexual responsibility and the biological, social, psychological growth and development of human beings in terms of sex role identity. Three hours. Mr. Grams, Dr. Gray and Staff.

69 **FRESHMAN ADVISOR SEMINAR** First half of the two year program in which the advisor and his students meet to discuss contemporary issues in human de-

velopment and early childhood. Students may enroll twice in this course. Two hours. Staff.

80-81 **HUMAN DEVELOPMENT** A two semester comprehensive survey of development across the life cycle. Three hours lecture and one hour optional discussion each semester. *Prerequisite:* sophomore standing. Six to eight hours. Messrs. Goldhaber, Shelton, and staff.

82 **CREATIVE CURRICULUM ACTIVITIES FOR THE EARLY CHILDHOOD YEARS I** Planning interdisciplinary program materials for children on an individual and group basis using movement, graphic, plastic, language arts. *Prerequisite:* Permission of instructor. Three hours. Ms. Jameson.

163 **THE EMERGING FAMILY** Development of parents and children in various stages of the family life cycle and various emerging family forms. *Prerequisite:* sophomore standing. Three hours. Ms. Jameson and staff.

164 **PARENT-CHILD RELATIONS** Interpersonal relations of adults and children and the application of underlying principles in parent education and family consulting. *Prerequisite:* 63 or consent of instructor. Three hours. Mr. Grams.

169 **SOPHOMORE ADVISOR SEMINAR** An ongoing seminar for Human Development majors. Readings; study and discussion of current issues, research, publications and professional affairs. *Prerequisites:* sophomore standing, Early Childhood and Human Development Major. A student may enroll twice in this course. Two hours. Staff.

182 **CREATIVE CURRICULUM ACTIVITIES FOR THE EARLY CHILDHOOD YEARS II (2-2)** Planning interdisciplinary program materials for children on an individual and group basis emphasizing mathematics, the natural ecology, and general sciences. *Prerequisites:* 63 and permission of instructor. Three hours. Ms. Jameson.

184 **EARLY CHILDHOOD PROGRAMS (3-0)** An active examination of present day early childhood programs in relationship to their historical development from early history. Three hours. Staff.

187 **FIELD PRACTICUM** Supervised teaching in accredited early childhood facilities licensed or approved by responsible boards. *Prerequisite:* permission of instructor. Eight hours. Ms. Jameson.

188 **ADMINISTRATION SEMINAR FOR EARLY CHILDHOOD PROGRAM** Administration and planning for an early childhood development center. *Prerequisite:* Early Childhood Major. One hour. Staff.

189 **EARLY CHILDHOOD PRACTICES (1-5)** Supervised planning and conducting the early childhood laboratory center. *Prerequisite:* Permission of instructor. Seven hours. Ms. Jameson and staff.

261 **INTERNATIONAL PROGRAMS IN EARLY CHILDHOOD DEVELOPMENT** An examination of the practices and interrelated services in the field of early childhood in several countries. *Prerequisite:* 184, or equivalent. Three hours. Staff.

264 **CONTEMPORARY ISSUES IN PARENTING** Contemporary cultural factors that influence adult lifestyles and their relationship to successful parenting. *Prerequisite:* 9 hours in Human Development or permission of instructor. Three hours. Mr. Goldhaber and Ms. Jameson.

265 **FAMILY LIFE AND SEX EDUCATION IN SCHOOL AND COMMUNITY** Methods, materials and philosophy of family life and sex education in the schools. *Prerequisites:* 65, Senior standing and consent of instructor. Three hours. Mr. Grams.

266 **SEMINAR IN HUMAN DEVELOPMENT** Intensive study of issues in human development and their application in a wide variety of professional areas. May be taken more than once up to a maximum of 12 credits. *Prerequisites:* Junior standing, 9 hours of Human Development or equivalent. Three hours. Staff.

Field Experience, Seminars, Special Topics and Research

290 **INTRODUCTION TO RESEARCH** Research procedures with lectures and discussions of problem selection, objectives, bibliographical techniques, and analysis of data. One hour. Mr. Tyzbir.

291 **SPECIAL PROBLEMS** Reading, discussion, and special field and/or laboratory investigations. *Prerequisite:* departmental permission. Students may enroll more than once for a maximum of twelve hours. One-Six hours. Staff.

295 **SPECIAL TOPICS** Lectures, laboratories, readings or projects relating to contemporary areas of study. Enrollment may be more than once; accumulation up to twelve hours. *Prerequisite:* Departmental permission.

296 **FIELD EXPERIENCE** Professionally oriented field experience under joint supervision by faculty and business or community representative, credit arranged up to fifteen hours. *Prerequisite:* Departmental permission.

Program in Home Economics Education

15 **PARTICIPATION** (See Education 15) Credit to be arranged. Staff.

71 **INTRODUCTION TO HOME ECONOMICS EDUCATION** Careers in home economics education, contemporary programs, professional and youth organizations, and resources. Independent study, field trips, experiences in teaching. *Prerequisite:* sophomore standing. Three hours. Miss Osborn.

171 **METHODS OF TEACHING** Three week concentrated course emphasizing teacher competencies in home economics. Planning, executing and evaluating instruction; management; guidance; school-community relations; professional development. *Prerequisites:* 71; psychology 1. Three hours. Staff.

172 **STUDENT TEACHING** Supervised observation and teaching in approved home economics programs in Vermont schools. *Prerequisite:* 171. Seven hours. Miss Osborn and staff.

173 **COMMUNICATION METHODS** Presentation of information through the media of press, radio and television, and lecture-demonstration. *Prerequisite:* junior standing. Three hours. I. Miss Osborn and Mr. Spaven.

174 **EXTENSION EXPERIENCE** Seven weeks off campus supervised jointly by extension and resident faculty. *Prerequisite:* SW 51 and HEC 171 or Votec 156 or Votec 112. Seven hours. Staff.

175 **SPECIAL PROBLEMS IN HOME ECONOMICS EDUCATION** Individual investigation of a problem selected to meet special needs of students. Students may accumulate up to six hours. *Prerequisite:* 71 and permission of instructors. Two or three hours. Miss Osborn and staff.

177 **TEACHING SPECIAL GROUPS** Independent study and teaching experience in home economics programs designed for adult, occupational and/or elementary classes. *Prerequisite:* 171. Students can enroll more than once for a maximum of 3 hours in each area or 9 hours total. Miss Osborn and staff.

272 **TEACHING ADULTS** Organization and teaching of classes in home economics to meet the needs of adults; supervised experience in teaching adults. *Prerequisite:* 171, or permission of instructor. Two hours. Staff.

273 **OCCUPATIONAL EDUCATION (2-3)** Role of the home economics teacher in organizing and implementing wage earning educational units at the secondary school level. *Prerequisite:* 171, or experience in secondary home economics education. Three hours. Miss Osborn.

274 **HOME ECONOMICS IN ELEMENTARY AND MIDDLE SCHOOLS** Home Economics, an integral part of curriculum, grades one through eight. Observations of children in these grades. Participation in schools. *Prerequisites:* 63, 71. Three hours. Miss Osborn.

Program in Housing, Consumer Economics and Home Management

Consumer Economics and Home Management

56 **PRINCIPLES OF HOME MANAGEMENT** Family and individual management techniques. Application to use of time, energy, and money. Introduction to consumer economics. Three hours. Mrs. Reidel.

158 **CONSUMER PROBLEMS** The consumer in the economy: modern buyer/seller relationships, agencies providing consumer information and protection, lecture, readings, demonstration problems. *Prerequisite:* junior or senior standing. Three hours. Staff.

256 **HOME MANAGEMENT PROBLEMS** Application of economic and sociological principles to some problems of the home and family. *Prerequisites:* 56; economics 12; psychology 1. Three hours. Staff.

258 **FAMILY ECONOMICS** The American family as a socio-economic unit; acquiring resources, managing current consumption, planning for future consumption. *Prerequisites:* 56; economics 3 or 12. Three hours. Staff.

Housing

50 **ARCHITECTURAL DRAWING (1-4)** Basic understanding of architectural and construction methods and drawing. Three hours. Staff.

51 **FAMILY HOUSING SELECTION** A study of the problems involved in selecting living environments for families including site location, financing, structure and space design. Three hours. Miss Knowles.

52 **SOCIO-ECONOMIC ASPECTS OF HOUSING** The housing needs of families including low income, elderly, physically handicapped and minority groups; programs devised to aid housing problems. Three hours. Miss Knowles.

151 **HOUSE PLANNING (1-4)** An advanced study of housing design to meet family requirements, application of home management principles. *Prerequisite:* 51. Three hours. Miss Knowles.

152 **HOUSING AND THE COMMUNITY (3-0)** A humanistic study of the role housing plays in land-use planning. Neighborhood and community planning related to family life styles. *Prerequisites:* 51 or 52 or permission of instructor. Three hours. Staff.

154 **HOUSEHOLD EQUIPMENT (2-2)** Application of scientific principles to the selection, operation and care of household equipment. Three hours. Miss Knowles.

155 **EXPERIMENTAL EQUIPMENT (1-4)** Performance measurement and rating of household equipment. *Prerequisite:* 154. Three hours. Miss Knowles.

251 **ADVANCED HOUSING** Investigation of housing data and current problems including studies of environmental factors, technological developments and governmental programs. *Prerequisites:* 51; economics 12 and sociology 21. Three hours. Miss Knowles.

Program in Human Nutrition and Foods

37 **BASIC CONCEPTS OF FOODS (2-2)** Basic principles of food purchasing and preparation presented through demonstration, lecture and laboratory participation. I, II. Three hours. Mrs. Soule and Miss Williams.

40 **BASIC CONCEPTS OF CONTEMPORARY NUTRITION (3-0)** Basic concepts of nutrition with special emphasis on problem-solving as it relates to contemporary nutrition. Three hours. I, II. Mrs. Livak.

41 **CLINICAL NUTRITION (3-0)** Fundamental nutrition information related to clinical settings in which health personnel may be expected to function on the technical level. Three hours. Staff.

✓43 **FUNDAMENTALS OF NUTRITION (See Animal Sciences 43)** Three hours. Mr. Carew. Credit will not be given for both 43 and 141.

135 **ADVANCED FOOD PREPARATION (2-4)** Scientific principles and processes underlying food preparation and preservation. *Prerequisites:* 37 and a course in organic chemistry or equivalent. Four hours. I, II. Mrs. Livak.

137 **MEAL MANAGEMENT (1-5)** Principles and practice in planning, preparing and serving family meals. *Prerequisite:* 37 and a college course in nutrition. Three hours. I, II. Mrs. Soule.

138 **QUANTITY FOOD PRODUCTION AND SERVICE (3-4)** Application of principles and techniques of food production and service in different establishments including equipment, sanitation, and time-motion studies. *Prerequisite:* 137. Five hours. Mr. Emanuel.

139 **INSTITUTIONAL PURCHASING AND FOOD COST CONTROL (3-0)** Principles of institutional purchasing, accounting, food cost control, and menu planning. *Prerequisite:* 137. Three hours. Mr. Emanuel.

140 **CHILD NUTRITION (3-0)** Nutritional implications in growth and development, conception through adolescence, emphasizing interrelationships with social, cultural and economic factors. Designed for students in Human Development and Education. *Prerequisite:* sophomore standing. Three hours. Miss Williams.

141 **NUTRITION AND HEALTH (3-0)** Basic principles of nutrition. Nutrient content of foods. Practice in recording and evaluating dietary intake of individuals. *Prerequisites:* Chemistry 4, Zoology 6. Three hours. Miss Powell. Credit will not be given for both 43 and 141.

144 **APPLIED NORMAL NUTRITION (2-2)** Nutritional needs of individuals during the life cycle. Physiological and environmental factors which affect nutrition-

al status. Designed for nutrition majors. *Prerequisites:* 43 or 141, chemistry 4 or 16 and physiology. Three hours. Miss Powell.

145, 146 **DIET MODIFICATION IN DISEASE** Modification of the diet in prevention and treatment of disease. Role of diet in nursing care. Integrated with Nursing 125, 126 and 176. *Prerequisite:* 141. Four hours. I, II. Miss Powell.

148 **COMMUNITY INVOLVEMENT-PROBLEMS IN FOODS AND NUTRITION (3-0)** Individual investigation of a specific problem relating to nutritional health of people. Focus on analysis and solutions of the problem. *Prerequisite:* college course in nutrition and departmental permission. Three hours. Mrs. Livak.

232 **COMPUTER IN FOOD SERVICE (3-0)** An orientation to the use of the computer as an administrative tool in dietetics and food service management. *Prerequisite:* 138. Three hours. Miss Merrow.

235 **RECENT ADVANCES IN FOODS AND NUTRITION** Interpretation, application and communication of trends in foods and nutrition as evidenced through literature and research. *Prerequisites:* 12 hours in foods and nutrition and related areas. Three hours. Staff.

236 **INTRODUCTION TO FOOD RESEARCH (1-4)** Methods and techniques in experimental work in foods. Independent laboratory study of problems in food preparation. *Prerequisite:* 135. Three hours. Mrs. Livak, Miss Williams.

237 **READINGS IN FOODS** Critical survey of the literature on the recent developments in food research. *Prerequisites:* senior standing; 135. Two or three hours. Staff.

238 **WORLD DIETARY PROBLEMS (3-0)** A background for understanding the causes of under-nutrition, the magnitude of the problem, and the programs seeking workable solutions. *Prerequisites:* 6 credits in nutrition or departmental permission. Three hours. Miss Williams.

239 **INSTITUTIONAL ORGANIZATION AND MANAGEMENT (3-0)** Institutional organization and management; personnel policies; laws and regulations; promotion and advertising. *Prerequisites:* 138, 139, or equivalent. Three hours. Mr. Emanuel.

240 **METHODS IN NUTRITION EDUCATION (3-0)** Problems common to nutrition education in schools, hospitals and community. Individual investigations selected to meet special needs. *Prerequisite:* 43 or 140 or 141. Three hours. Mrs. Soule.

246 **ADVANCED NUTRITION (3-0)** A study of nutrients and their specific functions in metabolic processes. *Prerequisites:* 43 or equivalent, and a course in biochemistry and physiology. Three hours. Mr. Tyzbir.

247 **DIET THERAPY (4-0)** Adaptations of the normal diet in conditions affected by or affecting the utilization of food. *Prerequisites:* 246, biochemistry, physiology. Four hours. Miss Powell.

248 **READINGS IN NUTRITION** Critical survey of the literature on recent developments in nutrition. *Prerequisite:* 246, or departmental permission. Two or three hours. Staff.

249 **NUTRITION SEMINAR** A review of recent developments in nutrition with special emphasis on nutritional problems on a worldwide basis. *Prerequisite:* a college course in principles of nutrition. Three hours. Staff.

294 HISTORY OF NUTRITION Foremost investigators and methods involved in the development of present day nutritional knowledge. *Prerequisite:* three hours of nutrition. One hour. Staff.

V Japanese

COLLEGE OF ARTS AND SCIENCES

Mr. Andrews and Staff.

1-2 ELEMENTARY READING AND CONVERSATION A study of the spoken language and the written syllabary through instruction by a native speaker and intensive use of language tapes. Four hours each semester. Mr. Andrews.

11, 12 INTERMEDIATE READING AND CONVERSATION A continuation of Japanese 1-2 toward an ability to converse in everyday Japanese and to read simple graded texts using upwards to nine hundred ideograms. Four hours each semester. *Prerequisite:* Japanese 1-2. Mr. Andrews.

21, 22 TUTORIAL READINGS IN JAPANESE Tutorial study conducted in Japanese of a variety of texts utilizing the two thousand "standard use ideograms." Three hours each semester. *Prerequisite:* Japanese 11, 12. Mr. Andrews.

V Mathematics¹

COLLEGE OF ENGINEERING, MATHEMATICS AND BUSINESS ADMINISTRATION

Professors Schoonmaker (Chairman), Brock, Chamberlain, Izzo, Lighthall, Meserve, Moser, Riggs and Sylwester; Associate Professors Bee, Burgmeier, Cooke, Dwork, Hill and Wright; Assistant Professors Aggarwal and Ashikaga; Instructors Burns, Hatcher, Kost, Morency, Mosca, Puterbaugh and Williams.

1 ELEMENTARY COLLEGE ALGEBRA Review of fundamental operations and a more extensive study of fractions, exponents, radicals, linear and quadratic equations. Additional topics to be discussed include ratio, proportion, variation, progressions and the binomial theorem. This course covers the topics normally included in intermediate algebra in high school. Students who have satisfactorily completed two years of high school algebra, or the equivalent, will receive no credit for this course. Offered only in Summer Session. Three hours. Staff.

2 PLANE TRIGONOMETRY A study of trigonometric functions, their graphs and other properties, logarithms, solution of triangles, trigonometric equations and identities, and inverse trigonometric functions. *Prerequisite:* 1 or 9. Three hours. Staff.

¹For many mathematics courses it will be assumed that the enrolled student knows how to program the University computer and how to use the University computer facility. This knowledge can be acquired by attending an informal six hour session arranged by the director of the academic computer facility.

4 **MATHEMATICS OF FINANCE** Mathematical theory of finance applied to interest and investments, annuities, and life insurance. *Prerequisite:* 1 or 9. Three hours. Staff.

5 **PRE-CALCULUS MATHEMATICS** Skills in working with numerical, algebraic and trigonometric expressions are developed in preparation for Mathematics 11 or 13. *Prerequisite:* Two years of secondary school algebra and one year of geometry. Three hours. Staff.

7, 8 **FUNDAMENTALS OF MATHEMATICS I, II** A liberal arts elective designed to illustrate both the enjoyment and the utility of a variety of mathematical concepts. *Prerequisite:* One year each of secondary school algebra and geometry; 7 for 8. Three hours Staff.

9 **COLLEGE ALGEBRA** A study of sets, relations, and functions with particular attention to properties of algebraic, exponential, and logarithmic functions, their graphs and applications. Students who have earned credit for any higher numbered course in mathematics may not enroll in this course for credit. Credit will not be given for both mathematics 7 and 9. *Prerequisite:* two years of secondary school algebra and one year of secondary school geometry. Three hours. Staff.

11¹ **ANALYTIC GEOMETRY AND CALCULUS I** A few topics from College Algebra and an introduction to plane analytic geometry and calculus. This course prepares students for mathematics 12. Credit will not be given for more than one of the courses 11, 13, 25. *Prerequisite:* 5, or 9 and 2, or sufficiently strong background in secondary school algebra and trigonometry. Five hours. Staff.

12 **ANALYTIC GEOMETRY AND CALCULUS II** A continuation of the study of plane analytic geometry, differential and integral calculus and their applications, vectors, and solid analytic geometry. *Prerequisite:* 11. Five hours. Staff.

13¹ **ENGINEERING MATHEMATICS I** Some plane analytic geometry and calculus of algebraic functions with applications. This course is intended primarily for engineering students. Credit will not be given for more than one of the courses 11, 13, 25. *Prerequisite:* 5, or 9 and 2, or sufficiently strong background in secondary school algebra and trigonometry. Four hours. Staff.

14 **ENGINEERING MATHEMATICS II** A continuation of mathematics 13 including transcendental functions, techniques of integration, applications of the calculus and solid analytic geometry. *Prerequisite:* 13. Four hours. Staff.

25 **FUNDAMENTALS OF CALCULUS I** An introduction to limits and differential calculus with a wide variety of applications. Students interested in intensive use of mathematics should take Mathematics 11 or 13. Credit will not be given for more than one of the courses 11, 13, 25. *Prerequisite:* 9 and 2 or sufficiently strong background in secondary school algebra and trigonometry. Three hours. Staff.

26 **FUNDAMENTALS OF CALCULUS II** An introduction to integral calculus and linear algebra with a wide variety of applications. Credit will not be given for more than one of the courses 11, 13, 26. A student who completes Mathematics 26 may be admitted to Mathematics 12 upon the recommendation of his Mathematics 26 instructor. *Prerequisite:* 25. Three hours. Staff.

¹Those who are deficient in high school mathematics for their chosen curriculum are urged to attend summer school prior to their first semester in college.

31 **INTRODUCTION TO COMPUTER SCIENCE** Structure of a digital computer. Introduction to flow charting and machine oriented languages. Programming and coding in a commonly used language. Practical experience with the solution of various types of problems on a university computer (presently system 360/44). *Prerequisite:* 9 or the equivalent. Two hours. Staff.

33 **FINITE MATHEMATICS** Review of set algebra, semigroups and groups, directed and undirected graphs: Boolean algebra and propositional logic. *Prerequisite:* two years of secondary school algebra and one year of secondary school geometry. Three hours. Staff.

40 **MATHEMATICS FOR BUSINESS** Elements of matrix operations, logarithms, exponential equations, differential and integral calculus and probability with applications to business. The Department recommends that credit not be given for any two of the courses 11, 13, 25, 40. *Prerequisite:* Two years of secondary school algebra. Four hours. Staff.

102 **FUNDAMENTAL CONCEPTS OF MATHEMATICS ANALYSIS** Sets, relations, functions, the Schroeder-Bernstein theorem, cardinal numbers, ordinal numbers, well-ordering, the Axiom of Choice, Zorn's lemma, rational numbers, fundamental sequences, real numbers, complex numbers, elementary topology of the reals and complexes. *Prerequisite:* credit or concurrent enrollment in mathematics 121. Three hours. Staff.

104 **FUNDAMENTALS OF MATHEMATICS OF COMPUTATION** An introduction to the mathematical theory and techniques underlying computer science. Topics include set theory, graph theory, Markov chains, game theory, semigroups, free monoids, finite groups and wreath products. *Prerequisite:* 12 or 14; Statistics 151 desirable. Three hours. Staff.

115 **INTRODUCTION TO COMPUTING I (2-2)** A survey of Computer organization, languages, logic and applications. Computer solutions of numerical and non-numerical problems using one or more programming languages. The laboratory component uses a disciplinary approach so that the student applies his computer knowledge to his areas of interest. *Prerequisite:* 9 or equivalent. Three hours. Staff.

116 **INTRODUCTION TO COMPUTING II** Computer structure, further machine language development, instruction execution, addressing techniques and digital representation of data. Symbolic coding and assembling systems, macros, linkage. Systems and utility programs. *Prerequisite:* 115. Three hours. Staff.

117 **INTRODUCTION TO OPERATIONS ANALYSIS** Problem definition, criteria, decision making; emphasis on modeling and simulation. Computerized simulations are accentuated. *Prerequisite:* 115 and either 11 or 13 or 25. Three hours. Mr. Brock.

121 **CALCULUS III** Partial differentiation, multiple integrals, infinite series, and elementary differential equations. *Prerequisite:* 12. Three hours. Staff.

123 **ENGINEERING MATHEMATICS III** A continuation of mathematics 14 including vectors, partial derivatives, multiple integrals, infinite series, complex numbers and elementary differential equations. *Prerequisite:* 14. Four hours. Staff.

124 **LINEAR ALGEBRA** A study of matrices, linear dependence, vector spaces, linear transformations and characteristic equations. *Prerequisite:* 11 or 13 or 25. Three hours. Staff.

125, 126 FUNDAMENTAL CONCEPTS OF ELEMENTARY SCHOOL MATHEMATICS Discussion of natural numbers, integers, fractions, decimals, and real numbers together with the fundamental operations and fundamental principles involving them. Number bases, sets, measurement and approximation, ratio, proportion, percentage, and selected topics from algebra which are a natural extension of arithmetic. Open only to students in elementary education. *Prerequisite:* sophomore standing; 125 for 126. Three hours. Staff.

179 TEACHING SECONDARY SCHOOL MATHEMATICS Contemporary secondary school mathematics curricula, their content from an advanced standpoint, unifying mathematical concepts and their implications at various levels, and the introduction of selected mathematical topics. Intended only for students with an interest in teaching secondary school mathematics. Not acceptable as part of any mathematics requirement for a degree. *Prerequisite:* Ed. 178, acceptance in teacher education, or permission of instructor. Three hours. Mr. Meserve.

203 ELEMENTS OF PROBABILITY For description see Statistics 151.

207 PROBABILITY THEORY For description see Statistics 251.

215 SOFTWARE FUNDAMENTALS Review of assembly language coding. Batch processing systems programs. IOCS buffer pool management, supervisors, loaders, utilities. Parallel processors, Interrupt handling, spooling. Introduction to multi-programming and time sharing. No graduate credit for mathematics majors. *Prerequisite:* 116. Three hours. Staff.

216 SYSTEMS PROGRAMMING Batch processing system programs. Parallel processing of Input-Output. Multiprogramming systems. Time sharing systems. *Prerequisites:* 223, 224 and credit or concurrent enrollment in 226. Three hours. Staff.

217 SWITCHING THEORY Lattices and Boolean algebras, Boolean functions, minimization theory, Quine's algorithm, combinational and sequential logic nets, state assignment problems, Hartmanis' theorems, closure operators, Paull-Unger problems. *Prerequisite:* 104. Three hours. Staff.

218 AUTOMATA THEORY Finite state automata, nondeterministic and two-way automata, theorems of Rabin-Scott, Myhill and Kleene. Regular expressions, homomorphisms, the lattice of automata, free automata, isomorphism theorems. *Prerequisite:* 104 or 217. Three hours. Mr. Aggarwal.

219, 220 MATHEMATICAL LOGIC Truth tables, axiomatic propositional calculus, independence, first order quantification theory, completeness theorems, prenex normal forms, decidability. Formal number theory, recursive functions, Gödel numbers, recursive undecidability, axiomatic set theory, ordinal numbers, the axiom of choice, effective computability, undecidable problems. *Prerequisites:* 102 or 104; 219 for 220. Three hours. Mr. Aggarwal.

221 DETERMINISTIC MODELS IN OPERATIONS RESEARCH Techniques of linear and dynamic programming and game theory. Graphs and tree models. Classical problems are discussed, and problem formulation stressed. *Prerequisites:* 124; 121 desirable. Three hours. Mr. Aggarwal.

222 STOCHASTIC MODELS IN OPERATIONS RESEARCH Stochastic processes and their use in analysis of industrial problems. Markov chains, queueing theory, linear and dynamic programming under uncertainty. *Prerequisites:* 203, or 207; 221. Three hours. Staff.

223 PROGRAMMING LANGUAGES Formal definition of programming languages including specification of syntax and semantics. Global properties of algorithmic languages. List processing, string manipulation and simulation languages. No graduate credit for mathematics majors. *Prerequisite:* 116. Three hours. Staff.

224 DATA STRUCTURES Lists, strings, arrays. Trees and graphs. Storage systems and structures. Storage allocation and garbage collection. Searching and sorting techniques. Generalized data management systems. No graduate credit for mathematics majors. *Prerequisites:* 104, 116, and credit or concurrent enrollment in 124. Three hours. Staff.

225 COMPILER CONSTRUCTION Organization of a compiler including compile and run time symbols tables, lexical scan, syntax scan and object code generation. *Prerequisite:* 216. Three hours. Staff.

226 COMPUTER ORGANIZATION Organization, logic design and components of a digital computer. Features needed for multi-programming, multi-processing time-sharing and real time systems. No graduate credit for mathematics majors. *Prerequisites:* 104, 116, 124. Three hours. Staff.

228 ADVANCED SYSTEMS PROGRAMMING Advanced study and research in a selected area of systems programming. *Prerequisite:* 216. Three hours. Staff.

229 COMPUTER FACILITY MANAGEMENT Non-mathematical content, problems of technical administration, budget considerations, open-closed shop, equipment proliferation, interorganizational relationships. *Prerequisites:* 116 or permission of instructor. Two hours. Mr. Brock.

230 ORDINARY DIFFERENTIAL EQUATIONS Solutions of linear ordinary differential equations, the Laplace transformation, and series solutions of differential equations. *Prerequisites:* 121, 124. Three hours. Staff.

231, 232 FUNCTION OF A COMPLEX VARIABLE Differentiation and integration of a function of a complex variable, mapping of elementary functions, infinite series, properties of analytic functions, analytical continuation, calculus of residues, contour integration, integral functions, meromorphic functions, Riemann surfaces, and conformal representation. *Prerequisite:* 242, 231 for 232. Three hours. Staff.

233, 234 THEORY OF FUNCTIONS OF REAL VARIABLES Functions of real variables, including: point sets and measure, transfinite numbers, Riemann and Lebesgue integrals, and sequences of functions. Considerable outside reading is assigned. *Prerequisite:* 242; 233 for 234. Three hours. Staff.

235 PARTIAL DIFFERENTIAL EQUATIONS First order equations, classification of second order equations, standard problems of Laplace and Cauchy. *Prerequisites:* 230, 242. Three hours. Staff.

236 CALCULUS OF VARIATIONS Necessary conditions of Euler, Legendre, Weierstrass and Jacobi for minimizing integrals. Sufficiency proofs. Variation and eigenvalue problems. Hamilton-Jacobi equations. *Prerequisite:* 230. Three hours. Staff.

237 NUMERICAL METHODS I Concept of error, polynomial approximation, summation techniques, solution of equations, linear systems, eigenvalues. *Prerequisites:* 121 and 124. Three hours. Staff.

238 **NUMERICAL METHODS II** Finite differences, differentiation and integration, ordinary and partial differential equations, linear programming. *Prerequisite:* 237. Three hours. Staff.

239 **INTEGRAL TRANSFORMS** The theory of Fourier, Laplace, Hankel and Mellin transforms with applications to fluid dynamics, elasticity, physics. *Prerequisite:* 231. Three hours. Mr. Burgmeier.

240 **OPERATIONAL MATHEMATICS** Orthogonal functions, transforms and boundary value problems. *Prerequisite:* 230 or 271. Three hours. Staff.

241 **ADVANCED CALCULUS I** Calculus of several variables, Euclidean spaces, open and closed sets, limits, continuity, differentiation (emphasizing the linearity), maxima and minima, Lagrange multipliers and integration of functions of several variables. *Prerequisite:* 121 and 124. Three hours. Staff.

242 **ADVANCED CALCULUS II** Jacobians, change of variables in a multiple integral, line and surface integrals, Green's, Gauss', and Stokes' Theorems, Fourier Series, Fourier and Laplace transforms. *Prerequisite:* 241. Three hours. Staff.

251 **MODERN HIGHER ALGEBRA** Fundamental concepts of Abstract Algebra. Sets, mappings, groups, rings, integral domains, fields, homomorphisms and isomorphisms. *Prerequisite:* 12; 102 or 104 highly desirable. Three hours. Staff.

252 **ADVANCED LINEAR ALGEBRA** Linear transformations and vector spaces, including Jordan forms. Symmetric, Hermitian, orthogonal and unitary matrices, and quadratic forms. *Prerequisite:* 124; 251 desirable. Three hours. Staff.

253, 254 **TOPOLOGY** The elements of point set topology: closed sets and open sets in metric spaces, continuous mappings, connection, Peano curves, separation theorems and homotopy. *Prerequisites:* 102, 253 for 254. Three hours. Staff.

255 **ELEMENTARY NUMBER THEORY** Divisibility, prime numbers, Diophantine equations, congruence of numbers, and methods of solving congruences. *Prerequisite:* 121. Three hours. Staff.

256 **ANALYTIC NUMBER THEORY** Prime numbers, prime number theorem, interchange of summations, Euler phi function, Mobius function, Riemann zeta function. *Prerequisite:* 232. Three hours. Mr. Brock.

257 **THEORY OF GROUPS** The study of the various kinds and structures of groups. *Prerequisite:* 251. Three hours. Staff.

258 **GALOIS THEORY** The study of Galois theory leading to the insolubility of general quintic equations by radicals and theorems on construction with straightedge and compass. *Prerequisite:* 257. Three hours. Staff.

260 **FOUNDATIONS OF GEOMETRY** Geometry as an axiomatic science; various non-Euclidean geometries; relationships existing between Euclidean plane geometry and other geometries; invariant properties. *Prerequisite:* 12. Three hours. Messrs. Izzo, Meserve and Riggs.

261 **THE DEVELOPMENT OF MATHEMATICS** The historical development of the mathematical sciences is considered with an emphasis upon the interrelations among these sciences. Individual students are expected to emphasize the specific aspects of mathematics that are of interest to them and the level of abstraction that is compatible with their previous experience. *Prerequisite:* 9 hours of college mathematics. Three hours. Staff.

262 **GEOMETRY FOR ELEMENTARY SCHOOL TEACHERS** An informal approach to geometry is considered with an emphasis upon the use of intuitive geometric

concepts in the introduction or clarification of most topics of elementary school mathematics. Not open to mathematics majors. *Prerequisite:* 126. Three hours. Staff.

263 **PROJECTIVE AND AFFINE GEOMETRIES** The principle of duality, perspective, projectivity, harmonic sets, cross ratio, the theorems of Pascal and Brianchon, poles and polars. *Prerequisite:* 124. Three hours. Staff.

264 **VECTOR ANALYSIS** Introduction to general vector methods including the elements of vector algebra and vector calculus with applications to physics and mechanics. *Prerequisite:* 121. Three hours. Staff.

265 **DIFFERENTIAL GEOMETRY** Analytic metric differential geometry of curves and surfaces in ordinary three dimensional space; curvature, torsion. Frenet formulas, involutes, evolutes developable and ruled surfaces, geodesic curves. *Prerequisite:* 121. Three hours. Staff.

266 **MATHEMATICS OF DIGITAL COMPUTATION FOR TEACHERS** Mathematical theory underlying digital computing machines including assigned problems on a University computer, including programming in computer system language. A portion of the course is devoted to elementary numerical analysis. *Prerequisites:* 121, 124 highly desirable. Three hours. Staff.

271 **APPLIED MATHEMATICS FOR ENGINEERS AND SCIENTISTS I** Matrix Theory, Vector Analysis, Linear Ordinary Differential Equations. Emphasis on methods of solution, including numerical methods. No credit for mathematics majors. For a mathematics concentration, a sequence beginning with 230 is advised. *Prerequisites:* 123 and knowledge of computer system programming. Three hours. Staff.

272 **APPLIED MATHEMATICS FOR ENGINEER AND SCIENTISTS II** Partial Differential Equations of Mathematical Physics, Calculus of Variations, Functions of a Complex Variable, Cauchy's Theorem, integral formula. Conformal mapping. *Prerequisite:* 271. Three hours. Staff.

273 **INTRODUCTION TO COMBINATORICS** Combinatorial relations, elementary problems of existence, enumerative combinatorics; generating functions and graphs. Applications to problems in probability, mathematics of computers, graph theory and number theory. No graduate credit for mathematics majors. *Prerequisite:* 104. Three hours. Staff.

279, 280 **SPECIAL PROJECT** An approved project under the guidance of a staff member and culminating in a written report. Involvement with off-campus groups is permitted. *Prerequisite:* Junior or Senior standing and approval of the Chairperson of the Department. One to three hours as arranged.

281, 283, 287, 289, 291, 293 **SPECIAL TOPICS** For advanced students in the indicated fields. Lectures, reports and directed readings on advanced topics. *Prerequisite:* Consent of instructor. Credit as arranged. Offered as occasion warrants. Staff.

281 **SPECIAL TOPICS IN APPLIED MATHEMATICS**

283 **SPECIAL TOPICS IN COMPUTER SCIENCE**

287 **SPECIAL TOPICS IN ALGEBRA**

289 **SPECIAL TOPICS IN TOPOLOGY**

291 **SPECIAL TOPICS IN GEOMETRY**

293 **SPECIAL TOPICS IN ANALYSIS**

Other Courses in Mathematics

In addition to the courses offered during the academic year, the following courses may be offered in summer sessions and in the evening division program.

Number	Title	Credit Hours
A15	Plane Analytic Geometry	3
A16	Differential Calculus	3
A17	Integral Calculus	3
A18	Intermediate Calculus	3
A19	Differential Equations	3
S45	Coordinate Geometry and Vectors	3
S46	Elementary Functions	3
S47	Calculus I	3
S48	Calculus II	3
S142	Fundamental Concepts of Algebra	3
S144	Statistics and Probability	3

Medical Microbiology

COLLEGE OF MEDICINE

Professors Stinebring (Chairman); Associate Professors Boraker, T. Moehring, Novotny, Phillips, and Schaeffer; Assistant Professor Albertini, Fives-Taylor, J. Moehring; Instructor Gallagher.

120 CLINICAL MICROBIOLOGY (3-6) Lectures and laboratory experiments in clinical aspects of microbiology. Fall semester. *Prerequisite:* Microbiology 55. Six hours. Dr. Fives-Taylor.

203 THE MAMMALIAN CELL AS A MICROORGANISM Discussion of such current ideas in cell biology as cell immortality, transformation, dedifferentiation, synchronization, cell-macromolecule interaction; laboratory will illustrate current cell culture techniques as a foundation for the lectures. Designed for biology students of varied training. Four hours. Dr. Moehring and Dr. Schaeffer.

205 PATHOGENIC BACTERIOLOGY Studies of major species of pathogenic bacteria with emphasis on mechanisms of disease production, epidemiology, control measures, and diagnosis. Designed for advanced undergraduate or graduate students interested in phenomenon of parasitism. *Prerequisite:* permission of the instructor. Three hours. Dr. Stinebring.

211 GENETICS OF MICROORGANISMS Studies of mutation, genetic information transfer, fine structure of the gene, cytoplasmic inheritance, and lysogeny in fungi, bacteria, and viruses. *Prerequisite:* permission of the instructor. Three hours. Dr. Novotny.

223 IMMUNOLOGY Analysis of the immune response with respect to structure and function of immunoglobulins, cytokinetics and immunocompetence, tolerance, ontogeny and phylogeny of adaptive immunity, immunogenetics of transplantation, hypersensitivity states, and theories of antibody formation. *Prerequisites:* Consent of the instructor. Four hours. Dr. Boraker.

Medical Technology

SCHOOL OF ALLIED HEALTH SCIENCES

Associate Professor Breen (Acting Chairperson, Department of Medical Technology); Assistant Professor Sullivan; Instructors Czerniawski, Page, Piner, Reed, Rogers, Russell; Clinical Instructors Albarelli, Coble, Cote, Fairbanks, Isham, Letourneau, Rapsinski, Standage, Thomas, Wilbur, Wyllie.

Note: All courses limited to students of Medical Technology except by permission of the Departmental Chairman.

3 MEDICAL TECHNOLOGY Medical Terminology. Terminology related to medical science and Hospital services. Required of all students in the Department of Medical Technology, open to other Health Science students by permission of departmental chairman. One hour. Staff.

11 LABORATORY SCIENCE Designed to introduce students to some of the more basic concepts of science as they relate to the field of laboratory science. Units of study include basic electricity, genetics, urinalysis, laboratory safety, body fluid dynamics, biological rhythms. Required of all students in the Associate Degree Program. Offered in the Spring semester. Three hours. Staff.

20 CLINICAL CHEMISTRY Laboratory exercises include manual chemistry procedures as well as instrumentation in the analysis of body constituents. Practicum in Rowell Student Laboratory and the Mary Fletcher Unit Chemistry Laboratory. Required of all students in the Medical Laboratory Technician Program. Fall and spring semesters. Six hours. Ms. Piner, Sullivan, Wilbur.

21 HEMATOLOGY Techniques of basic laboratory procedures in hematology. Rotating assignment in the clinical laboratory provided by the Medical Center Hospital of Vermont. Required of second year students in Medical Technology. Fall and spring semesters. Four hours. Mr. Reed, Mr. Letourneau, and Ms. Wyllie, and Ms. Rogers.

22 CLINICAL IMMUNOHEMATOLOGY Introduction to human blood groups, compatibility testing, and identification of blood group antibodies. Includes lectures, student laboratory exercises and clinical practicum. *Prerequisite:* Senior MLT standing or permission of the instructor. Ms. Isham.

23 CLINICAL MICROBIOLOGY A course required for second year Medical Technology students which builds on the fundamentals of Microbiology 55 to include the isolation and identification of clinically significant pathogenic bacteria, from all types of clinical specimens. Includes didactic instruction and practicum in both clinical and student laboratories. *Prerequisite:* Microbiology 55; four hours; fall and spring semesters. Ms. Page, Ms. Rapsinski, Ms. Thomas.

101 MEDICAL TECHNOLOGY Principles, procedures and special techniques. Includes serology, parasitology, urinalysis, spinal fluids, and coagulation. Required of all third year students in Medical Technology. Spring semester. Four hours. Mr. Fairbanks, Mr. Reed, Ms. Sullivan, & Staff.

104 MEDT This course in clinical chemistry is designed to include in-depth advanced work in the chemistry laboratory. Included is work on multiple-channel auto-analyzers, the application of isotopes to the clinical laboratory, advanced

laboratory instrumentation and "trouble shooting". Attention is focused on the following factors: the normal and pathological conditions of the patient which are relevant, the source, preservation and handling of the sample, the chemical manipulation, the instrumental method and the significance of the result. Students are given an opportunity to develop the leadership characteristics, and basic supervisory skills that are required of a chemistry supervisor, and/or to acquire experience in the application of educational theory and skills in the practical situation.

105 MEDT This course is designed to build upon the basic skills learned in the Medical Laboratory Technician Program by providing advanced instruction in the theory and practice of clinical hematology. The course includes in-depth study of the physiology and pathophysiology of the blood and emphasis is placed on disease processes and concentrated study on peripheral and marrow smears. A further requirement is for the student to participate in the teaching of MLT students in both the formal (lecture) and informal (laboratory) setting.

106 MEDT This course is designed for those students enrolled in the advanced specialty core in Immunohematology. It will be taken in part with those students in the Hematology specialty and is designed to cover topics not covered in the MLT program, e.g., Complications of transfusion; storage and in vivo survival of blood components; antigen systems other than ABO & Rh; HAA testing; and disorders of coagulation mechanism.

110 CLINICAL CHEMISTRY Principles and techniques currently employed in the laboratory are explored. Facets covered include: pathological conditions which are relevant, the source, preservation and handling of the sample, the chemical manipulation, the instrumental method, and the significance of the result. Required of all students in the Medical Technology program. Fall and spring semesters. Six hours. Ms. Piner, Sullivan, Wilbur.

111 HEMATOLOGY Comprehensive study of principles, procedures, special techniques and disease states in hematology. Rotating assignments in the clinical laboratory provided by the Medical Center Hospital of Vermont. Required of fourth year students in Medical Technology. Fall and spring semesters. Four hours. Mr. Reed, Ms. Rogers, Mr. Letourneau, and Ms. Wyllie.

112 CLINICAL IMMUNOHEMATOLOGY Advanced study of human blood groups. Emphasis is on problem solving, advanced theory and special laboratory exercises, and clinical practicum. *Prerequisite:* Senior MT standing or permission of the instructor. Ms. Isham.

113 CLINICAL MICROBIOLOGY A course designed to give fourth year MT students the fundamentals of isolation and identification of clinically significant pathogenic microorganisms in routine and special Bacteriology. Planned to correlate with Microbiology 120, taken concurrently. Course includes clinical practicum, didactic instruction and student laboratory experiences. *Prerequisite:* Microbiology 55 and Spring semesters; four hours; Mr. Cote, Ms. Page, Ms. Rapsinski and Ms. Thomas.

160 MEDT A course taken by students enrolled in the Advanced Specialty Core in Hematology. The course is divided into two parts: a) Hospital practicum in Instrumentation, electronic-data-processing and Developmental Methodology b) Educational Methodology; preparation of teaching materials and teaching experience in the MLT student program.

161 MEDT (Advanced Practicum) For students in the Advanced Specialty Core in Hematology. The course consists of training and instruction in the following areas: Laboratory supervision, Laboratory Administration and technology of an Emergency Laboratory. In addition, there will be continued teaching experience in the MLT student program.

197-198 MEDICAL TECHNOLOGY Assigned readings and special topics. Fall and spring semesters. Three credits.

201 MEDICAL TECHNOLOGY, ADVANCED Individual research in the field of medical technology. *Prerequisite:* departmental permission. Credit as arranged. Fall and spring semesters. Miss Breen.

Microbiology and Biochemistry

COLLEGE OF AGRICULTURE

Professors Little and Racusen (Chairman); Associate Professors Foote, Sjogren, and Weller; Teaching Associate Husted.

55 INTRODUCTORY MICROBIOLOGY (2-4) The study of microorganisms, especially bacteria, their structure, development and activities. *Prerequisite:* eight hours of chemistry. Four hours. Mr. Sjogren. Also offered each spring. The fall term is reserved for Allied Health Science students except by permission of instructor.

195 SPECIAL TOPICS *Prerequisite:* permission of instructor.

197, 198 UNDERGRADUATE RESEARCH *Prerequisite:* Departmental permission. One to three hours.

201 GENERAL BIOCHEMISTRY (3-3) Broad coverage of biochemistry including principles of analytical biochemistry. *Prerequisite:* Chemistry 16 or 131. Four hours. Mr. Foote. Also offered each spring by Mr. Little.

202 ADVANCED BIOCHEMISTRY (3-3) A study of metabolic cycles with emphasis on research methods involving radioisotopes and chromatography. *Prerequisite:* 201 or 203 or permission of the instructor. Four hours. Mr. Racusen.

203 MOLECULAR BIOLOGY (3-3) The structure and biological function of nucleic acids, proteins, and enzymes. Emphasis is on optical, electrophoretic, and ultracentrifugal methods. *Prerequisite:* Chemistry 140 or 142 or permission of instructor. Four hours. Mr. Weller.

220 ENVIRONMENTAL MICROBIOLOGY (2-3) The activities of microorganisms, primarily bacteria, in air, soil, and water. *Prerequisite:* a previous course in microbiology. Three hours. Mr. Sjogren. Alternate years, 1975-76.

254 MICROBIAL BIOCHEMISTRY (2-4) The chemical composition and metabolism of microbial cells. *Prerequisite:* 55, 201, or permission of instructor. Four hours. Mr. Sjogren. Alternate years, 1974-75.

295 SPECIAL TOPICS *Prerequisite:* Permission of instructor.

Military Studies

Lieutenant Colonel Haponski (Chairman); Majors Barber and Safford; Captains Jones and Ness.

Note: MS 1, 2, 11, 12, 211, 212 are designed not just for ROTC cadets, but all University students interested in the part military forces play in national and international affairs. Laboratories are required only for ROTC cadets. Total allowable credit for Military Studies varies by College; check with Department of Military Studies.

1 INTRODUCTION TO MILITARY STUDIES (2-1) An overview of several aspects of war: warfare as seen by some notable military thinkers, impacts of war on civilization, principles of war, components of military power, and contemporary issues involving the use of military force in today's world. Fall. Two hours. Captain Jones.

2 U.S. DEFENSE ESTABLISHMENT (2-1) Evolution of the Establishment from Revolution to present. National security structure: President, National Security Council, Department of State, Congress, intelligence community, defense industries. The Department of Defense: Secretary, Joint Chiefs of Staff, Armed Forces, Defense agencies. Case study of Cuban missile crisis. Spring. Two hours. Captain Jones.

11 (HIST 181) U.S. MILITARY HISTORY (3-1) Development of American Military Establishment within framework of American History from Colonial Era to the present. Taught by History Department. Required of ROTC cadets. Fall. Three hours. Professor Stoler.

12 CONTEMPORARY WORLD MILITARY SCENE (2-1) Seminar on current international uses of military forces, viewed against a background of long range national concerns, especially of the U.S., Western European countries, U.S.S.R., China. Spring. Two hours. Major Safford.

101 LEADERSHIP AND MANAGEMENT I (2-1) Military cartography; fundamentals of educational psychology applicable to instruction; techniques used in planning, presenting, and evaluating instruction. The role of the various branches of the Army. Fall. Two hours. Captain Ness.

102 LEADERSHIP AND MANAGEMENT II (3-1) The psychological, physiological and sociological factors which affect human behavior; individual and group solution of leadership problems common to small units. Analysis of the leader's role in directing and coordinating the efforts of individuals and small units in the execution of tactical missions. Spring. Three hours. Captain Ness.

111 LEADERSHIP AND MANAGEMENT III (3-1) Study of combat operations and the various military teams; the coordination and planning necessary between the elements of the team. Special attention will be given to the development of leadership potential through practical exercises. Fall. Three hours. Major Barber.

112 LEADERSHIP AND MANAGEMENT IV (2-1) Analysis of selected leadership and management problems involved in unit administration, military justice, and the Army Readiness Program and determination of appropriate solutions. Obligations and responsibilities of an officer on active duty. Officer-enlisted relationships. Spring. Two hours. Major Barber.

211 **SPECIAL STUDIES** In depth analysis of military topic proposed by student. Guided research. *Prerequisite:* MS 1, 2, 11 and 12 or equivalent by permission of Chairman. Credit to be arranged. Staff.

212 **CONTINUATION OF 211** Staff.

For course listings of AIR FORCE ROTC, see page 67.

Music

COLLEGE OF ARTS AND SCIENCES

(Acting Chairman) W. Metcalfe; Professors Lidral and Pappoutsakis; Associate Professors Chapman, D. Kinsey, Read, Schultz and Wigness; Assistant Professors Weinrich and J. Ambrose; Instructors Boyer, Dahl, Davis, Dorsam, Fleming, F. Kinsey, E. Metcalfe, Ranney, E. Read, Scoones, Storandt, M. Vogelmann; Lecturer Bemis.

Students in all music courses are required to attend a designated portion of major ensemble concerts, faculty recitals, and formal student recitals as part of the course requirements.

Theory and Composition

5-6 **THEORY I (2-3)** Melodic and rhythmic dictation, sight singing, and elementary harmony. Three hours. Staff.

9 **INTRODUCTORY MUSIC—THEORY** Fundamentals of music: major and minor scales, intervals, transposition, rudiments of harmony, rhythm, terminology, the conventions of musical notation. Three hours.¹ Messrs. Pappoutsakis and Weinrich.

105-106 **THEORY II (2-3)** Contrapuntal and harmonic dictation, advanced harmony, and elementary counterpoint. *Prerequisite:* 5-6. Three hours. Staff.

203, 204 **ORCHESTRATION** First semester: characteristics of instruments, arranging for orchestra; second semester: advanced exercises in orchestral scoring. *Prerequisite:* 105-106; 203 for 204. Three hours. Mr. Pappoutsakis. 204 in alternate years, 1972-73.

205, 206 **COUNTERPOINT** First semester: tonal counterpoint; second semester: canon and fugue. *Prerequisite:* 105-106; 205 for 206. Three hours. Mr. Kinsey. 206 in alternate years, 1973-74.

207 **PEDAGOGY OF THEORY** Objectives, viewpoints, content and specific approach to the organization and teaching of theory courses. *Prerequisite:* eighteen hours in theory. Three hours. Mr. Lidral.

208 **FORM AND ANALYSIS** Creative approach to aural and sight analysis of musical construction. *Prerequisite:* 105-106; 205 recommended. Three hours. Mr. Kinsey.

215, 216 **COMPOSITION** Creative work in free composition with instruction according to the needs and capabilities of the individual student. *Prerequisite:* 205 and 208 or consent of instructor. Three hours. May be repeated for credit. Mr. Read.

¹Enrollment in 5 will cancel credit for 9.

History and Literature

1-2 **SURVEY OF MUSICAL LITERATURE** Chronological survey of the literature of music from the early forms to the present. 1st semester—to the symphony; 2nd semester—the symphony to the present. Three hours. Staff.

10 **INTRODUCTORY MUSIC—LISTENING** A study, from the listener's point of view, of music from the Baroque through the Classical and Romantic to the twentieth century contemporary periods. Stylistic, structural, and orchestral developments. Three hours.² Messrs. Pappoutsakis and Weinrich.

13 **CONTEMPORARY MUSIC** Development and stylistic characteristics of twentieth century music from the late Romanticists to the experimentalists. Both European and American composers will be presented. *Prerequisite:* 1, 2, or 10. Three hours. Mr. Read.

14 **JAZZ LITERATURE** The history of jazz music: African and American backgrounds; transition to jazz, growth, early jazz, further developments in the decades from the teens to the present. *Prerequisite:* Music 1, 2, or 10. Three hours. Mr. Bemis.

193, 194 **COLLEGE HONORS**

195, 196 **SPECIAL TOPICS**

197, 198 **READING AND RESEARCH**

221, 222 **HISTORY OF MUSIC** Changes in musical structure and style in relation to contemporaneous artistic, literary, religious, and social movements. First semester: Gregorian chant to the Baroque era. Second semester: Baroque to Modern. *Prerequisite:* 1, 2 and 5-6. Three hours. Mr. Chapman.

223 through 228 **MUSIC LITERATURE** Advanced studies in the literature of music. *Prerequisites:* 105-106 and 221, 222. Three hours. Mr. Chapman.

245, 246 **CHAMBER MUSIC LITERATURE** Study through analysis and performance of masterworks for small groups leading to public performance. *Prerequisite:* twelve hours or the equivalent in performance field and departmental permission. One hour. Staff.

281 through 284 **INDEPENDENT STUDY** Studies in theory, composition, history, or literature under the direction of an assigned staff member for advanced students and candidates for honors. Credit as arranged.

For Music Education, see page 195.

Performance

For the fees for instruction, see page 58.

A senior recital in the performance major field is required of all music majors. Regular appearances in informal recitals are required of all performance students. Appearance in one formal departmental recital a semester is required of all music majors. At the end of each semester jury examinations are given in applied music.

²Enrollment in 1 and 2 will cancel credit for 10.

All music majors on any curriculum are required to pass a **FUNCTIONAL PIANO FACILITY** examination before certification for graduation. This will include:

- a. Ability to sight-read songs of the type found in a community song book.
- b. Ability to harmonize at sight; to improvise a simple piano accompaniment for songs requiring the use of I, IV, and V chords and some simple modulations; to transpose the songs and harmonizations to other keys.
- c. Ability to sight-read fairly fluently simple accompaniments, vocal or instrumental, and simple piano compositions of the type used for school rhythmic activities.

41, 42 **MAJOR ENSEMBLES (0-3)** University Band, Choir, Choral Union, and Orchestra. Attendance at all rehearsals and public performances required. *Prerequisite:* departmental permission. One hour. Messrs. Chapman, Lidral, Schultz, and Weinrich. May be repeated for credit.

45, 46 **CHAMBER MUSIC (0-2)** Study and performance of masterworks for small groups. Attendance at all rehearsals and public performances required. Outside practice required. *Prerequisite:* departmental permission. One hour. Staff. May be repeated for credit.

51, 52 **PERFORMANCE STUDY¹** Individual instruction in piano, organ, classical guitar, harpsichord, voice, strings, woodwinds, brass, percussion, and harp. One to four hours.² For specific instruments see course schedules each semester. Staff.

71, 72 **CLASS STUDY (0-2)** Required of music education students, elective to others to limit of facilities and equipment. Class study in performance fields of voice, strings, woodwinds, brass, and percussion. One hour. Staff. May be repeated for credit.

74 **INSTRUMENT REPAIR CLASS (0-2)** A laboratory for music education students in minor repair and adjustment of string, woodwind, brass, and percussion instruments. *Prerequisite:* string, woodwind, brass, and percussion classes or concurrent enrollment and departmental permission. One hour. Mr. Schultz.

74A **PIANO REPAIR—TUNING** A course to acquaint students with the basic knowledge of piano construction, tuning and repairing. Departmental permission. One hour. Mr. Weinrich.

111 **MUSIC FOR ELEMENTARY TEACHERS** The development of musical skills, understandings, and attitudes pertinent to the teaching of music in the elementary classroom. *Prerequisite:* Sophomore standing. Three hours. Mr. Wigness.

112 **ELEMENTARY MUSIC METHODS** A course to aid the elementary classroom teacher in developing the potential musicality of students to the highest level through the practical application of musical skills and understandings already acquired by the teacher. *Prerequisite:* 111. Three hours. Mr. Wigness.

¹Indicated courses in performance may be repeated for credit.

²Each hour of credit in performance study requires one hour's practice per day, and credit will be given only on condition that the instruction be accompanied or preceded by a three-credit course in music and participation in ensemble, unless excused from the latter by the chairman.

211, 212 **CONDUCTING (2-2)** First semester: technique of the baton, score reading, laboratory practice; second semester: preparation and performance of selected scores, including rehearsal procedures. Selected students may conduct University major ensembles. *Prerequisite:* 5-6, 211 for 212. Three hours. Mr. Pappoutakis. 212 in alternate years, 1973-74.

271, 272 **PERFORMANCE PEDAGOGY** Methods of teaching voice, strings, woodwinds, brass, percussion, or keyboard instruments including repertoire suitable for use at various levels of ability. Significant literature of all historical periods in the major field. *Prerequisite:* Senior standing in performance and consent of instructor. Three hours. Staff.

Natural Resources

SCHOOL OF NATURAL RESOURCES

Professors Christensen, Cassell, John (Director), Oppenlander, Reidel, Sargent, Whitmore, and Wilm; Associate Professors Dawson, Hannah, and McCormack; Assistant Professors Armstrong, Donnelly, Downer, Gilbert, Hoekstra, Laible, Lindsay, Newton, and Olson; Lecturer Turner; Engineer Dunham; Adjunct Professors Foulds, Kiley, and Knight; Adjunct Associate Professor Bevins; Adjunct Assistant Professors Fuller, Malcolm, and Sterns.

Forestry

1 **INTRODUCTION TO FORESTRY** Introduction to forestry and conservation sciences. Two hours. Mr. Donnelly.

2 **FRESHMAN SEMINAR** Guest lecturers and student seminars on selected topics in forest resources management. One hour. Mr. Donnelly.

5 **DENDROLOGY (3-4)** Classification and silvical characteristics of native and exotic forest trees. Twig identification. *Prerequisite:* biology 1 or botany 4. Four hours. Mr. Hannah.

100 **FOREST BIOECOLOGY** Structure, dynamics, and manipulation of selected forest communities. *Prerequisite:* forestry 5. Four weeks in summer camp. Four hours. Mr. Donnelly, Mr. Fuller, and Mr. McCormack.

105 **MAN AND THE FOREST ENVIRONMENT (3-0)** Forest resources of North America, their uses and their influences on the environment. Three hours. Mr. McCormack.

107 **FOREST ENTOMOLOGY (See P & SS 107.)** Three hours. Mr. Parker.

112 **FOREST PATHOLOGY (2-2)** The principal diseases of forest trees and deterioration of forest products, with emphasis on prevention and control. *Prerequisite:* Botany 4 and Zoology 9 or Biology 1, 2. Three hours. Staff.

122 **SILVICS** Environmental factors and their influence upon the development, distribution, and succession of forest trees. *Prerequisite:* 5. Three hours. Mr. Donnelly.

123 **SILVICULTURE (2-3)** The production and tending of commercial forest stands. *Prerequisite:* 122. Three hours. Mr. McCormack.

124 **FOREST REGENERATION (2-0)** Practical application of forest genetics, planting stock production and establishment, and principles of natural regeneration for reproducing forests. *Prerequisite:* Junior standing. Two hours. Mr. McCormack.

126 **URBAN FORESTRY** Value of trees in the urban environment; selecting, planting and maintaining trees, diagnosing tree problems and discussion of specific problems with emphasis on non-parasitic injuries. *Prerequisites:* a course in tree identification and permission. Three hours. Mr. Donnelly.

132 **FOREST FIRE CONTROL** Forest fire ecology and behavior; causes and effects; danger measurements; prevention and control of fires; use of fire in forest management. *Prerequisite:* Sophomore standing and one forestry course. Two hours. Mr. Whitmore.

135 **FOREST RECREATION PLANNING (2-3)** Outdoor recreation site analysis, design, and development in the forest environment; forest recreation area management. *Prerequisites:* junior or senior standing and permission. Three hours. Mr. Lindsay.

136 **FOREST MANAGEMENT (2-2)** The planning and organization of forests for multiple-use sustained yield production. *Prerequisites:* 123 and 144. Three hours. Mr. Armstrong.

140 **FOREST BIOMETRY II** Boundary and topographic survey methods in forest management. Principles of forest biometry in forest-data collection. *Prerequisites:* C.E. 12, forestry 5, and forestry 144. Four weeks in summer camps. Four hours. Mr. Newton and Mr. Turner.

142 **FOREST PHOTOGRAMMETRY (2-3)** Identification, interpretation, measurement, and mapping of forest resources from aerial photographs. *Prerequisite:* 144. Three hours. Mr. Newton.

144 **FOREST BIOMETRY I (2-4)** Introductory concepts in forest biometry, measurement of trees and forest products, forest sampling and inventory with applications in multiple-use management. *Prerequisite:* Mathematics 110 or concurrent enrollment. Three hours. Mr. Newton.

151 **FOREST ECONOMICS** The economic principles and problems in the management and utilization of forest resources; taxation of forest lands; marketing of forest products. *Prerequisite:* economics 12. Three hours. Mr. Armstrong.

153 **FOREST POLICY AND ADMINISTRATION** Analysis of public and private forest policies and their administration in relation to other natural resources and to the people. *Prerequisite:* Junior standing in forestry. Three hours. Mr. Armstrong.

162 **WOOD TECHNOLOGY (2-3)** Properties, uses and identification of commercial woods of the United States. *Prerequisite:* Biology 1. Three hours. Mr. Whitmore.

163 **TIMBER HARVESTING (2-3)** Methods and costs of harvesting timber under different forest conditions and silvicultural treatments; organization and costs of logging operations. *Prerequisite:* 5. Three hours. Mr. Turner.

165 **FOREST PRODUCTS (2-3)** Wood products manufacture and distribution including lumber, veneer and plywood, pulp and paper. Wood preservation; naval stores; maple products. *Prerequisite:* 162. Three hours. Mr. Whitmore.

185 **SPECIAL TOPICS** Readings, investigations, lectures or work-study projects in selected forest resource areas. *Prerequisites:* junior standing and permission. One to three hours. Staff.

197, 198 **SENIOR RESEARCH** Work on a research problem under the direction of a staff member. Findings submitted in written form as prescribed by the department. *Prerequisites:* senior standing and permission. Three hours. Staff.

205 **MINERAL NUTRITION OF PLANTS** (See plant and soil science 205.) Three hours. Mr. Bartlett and botany and forestry staff. Alternate years, 1975-76.

207 **WATER RELATIONS OF PLANTS** Soil-plant water relations. Terminology and measurement of soil moisture. Absorption, transport, and transpiration by plants. Effects of water excesses and deficits. *Prerequisite:* permission. Three hours. Mr. Donnelly and botany and plant and soil science staff. Alternate years, 1974-75.

221 **SITE RELATIONS AND PRODUCTION DYNAMICS IN FORESTS (2-4)** Theory of site relations; total site concepts; and dynamics of dry matter production. *Prerequisite:* permission. Three hours. Mr. Hannah. Alternate years, 1975-76.

222 **ADVANCED SILVICULTURE** Scientific bases for specific silvicultural practices. *Prerequisite:* permission. Three hours. Mr. McCormack.

242 **ADVANCED FOREST BIOMETRY** Advanced principles of data collection, processing, and estimation as applied to forest-based resources. Current developments in the field of forest biometry. *Prerequisite:* 144. Three hours. Mr. Newton.

252 **FOREST VALUATION** Principles of valuation of forest growing stock, land and other forest resources. *Prerequisites:* 151 and 136 or concurrent enrollment. Two hours. Mr. Armstrong.

253 **FOREST MANAGEMENT DECISION THEORY (3-0)** Operations research procedures in forest management including wildlife, fire control, insect control, construction projects, and management of conservation programs. *Prerequisite:* Calculus. Three hours. Mr. Armstrong.

282 **FORESTRY SEMINAR** Review and discussion of current problems and controversies in natural-resource management. Required of forestry and wildlife seniors and graduate students. One hour. Staff.

Wildlife Biology

100 **WILDLIFE FIELD BIOLOGY AND ECOLOGY** Ecological methods and their application in examination of selected wildlife problems and biotic communities; emphasis on wildlife components, dependencies, and interactions. *Prerequisites:* Biology 1, 2 or Botany 4 and Zoology 9; Botany 160 or Forestry 122 recommended; sophomore standing. Three weeks in summer camp. Three hours. Mr. Fuller.

170 **WILDLIFE BIOMETRICS** Wildlife habitat measurement, analysis, description and mapping; capturing and marking wildlife; wildlife census. *Prerequisites:* Forestry 122, 144. Four weeks in summer camp. Four hours. Mr. Hoekstra.

174 **PRINCIPLES OF WILDLIFE MANAGEMENT** Plant and animal ecology applied to control of wildlife populations; properties of species and populations and habitats; consideration of game, non-game and endangered species. *Prerequisites:* Biology 1, 2 or Botany 4 and Zoology 9; a course in plant, animal, or general ecology. Three hours. Mr. Fuller.

175 **GAME MAMMALS** Behavior, ecology, metabolism, reproduction, taxonomy and zoogeography of the Class Mammalia emphasizing game species of North America. Introduction to specimen collection and preservation, sex and age determination, food habits analysis. *Prerequisites:* Biology 1, 2 or Botany 4 and Zoology 9. Four hours. Mr. Hoekstra.

187, 188 **UNDERGRADUATE SPECIAL PROJECTS** Individual projects supervised by a faculty member or other professional person. Projects may involve independent field or laboratory or library investigations, and work-study or internship arrangements with a cooperating private or public resource organization. Formal report required. *Prerequisites:* Junior standing and submission of a project prospectus for permission. A maximum of five hours in the program. Staff.

271 **WETLANDS WILDLIFE ECOLOGY** Life histories and management emphasizing N.A. waterfowl and furbearer resources; integration of aesthetic, ecological, recreational, and socio-economic values with contemporary uses of land and water. Field studies and one weekend trip. *Prerequisites:* Animal Science 158, Wildlife Biology 174, 175. Four hours. Mr. Fuller.

272 **UPLANDS WILDLIFE ECOLOGY** Integration of ecological principles, wildlife biology, land use and human dimensions in wildlife. Emphasis on development and maintenance of habitat requirements and population regulation in upland habitats. *Prerequisites:* Animal Science 158, Wildlife Biology 174, 175. Four hours. Mr. Hoekstra.

276 **DYNAMICS OF EXPLOITED WILDLIFE POPULATIONS** Analysis of natural and manipulated wildlife population parameters through simulation techniques. Emphasis on population management for commensurate benefit to wildlife and humans. *Prerequisites:* Wildlife Biology 271 or 272. Three hours. Mr. Hoekstra.

Resource Economics

121 **RESOURCE ECONOMICS** An evaluation of the economic forces affecting resource allocation, tools of economic analysis, and economic implications of current resource utilization practices. *Prerequisite:* economics 11 or resource economics 61. Three hours. Mr. Gilbert.

222 **NATURAL RESOURCE EVALUATION** A critical investigation of current research, allocation procedures, and methods of analysis in natural resource economics with emphasis on the public sector. *Prerequisite:* resource economics 121. Three hours. Mr. Gilbert.

225 **ECONOMICS OF OUTDOOR RECREATION** (see page 261).

233 **REGIONAL PLANNING** Delineation of regional boundaries, determination of public goals, tools of planning, quality environment planning and the legal and political process of planning. *Prerequisite:* senior standing and economics 11, 12, or equivalent. Three hours. Mr. Sargent.

235 **LEGAL ASPECTS OF PLANNING AND ZONING** An examination of Vermont planning and zoning law with comparisons with other states. Cases in planning and zoning and land use controls. *Prerequisite:* senior standing or consent of instructor. Three hours. Messrs. Sargent and Ewing.

Recreation Management

8 FRESHMAN RECREATION SEMINAR An introduction to the field of natural resource-based recreation. A broad perspective on history, agencies, policies, and future trends. Two hours. Staff.

135 FOREST RECREATION PLANNING (2-3) (See Forestry 135, Page 258).

150 RECREATION MANAGEMENT Field experience in recreation design, land measurement, and facility layout. *Prerequisites:* CE 12. Three weeks in summer camp. Three hours. Staff.

151 RECREATION BUSINESS MANAGEMENT Economic decision-making tools for the recreation or tourism manager. Emphasis on analysis of business investment and profitability over the recreation firm life. *Prerequisite:* Permission of the instructor. Three hours. Mr. Bevins. Credit cannot be granted for RM 151 and RSEC 166.

153 RECREATION OPERATIONS (2-3) The operation and administration of public recreation areas. Special emphasis on personnel and labor management; equipment purchase, storage, and maintenance; supply requisition, distribution, and consumption; crowd, vandalism and crime, and traffic control. *Prerequisite:* Recreation Management 151. Three hours. Mr. Lindsay and Mr. Baker.

156 PARK INTERPRETATION Discussions and application of the principles and techniques used to communicate values, natural systems, and cultural features to park visitors. Exposure to the collecting, analysis, planning, construction, and use of interpretive media and related outdoor facilities. *Prerequisite:* Senior standing and permission of the instructor. Three hours. Mr. Lewis.

157 SKI AREA MANAGEMENT An analysis of current management problems affecting private ski areas in Vermont and the Northeast. *Prerequisite:* Senior standing and permission. Three hours. Mr. Gilbert.

159 PARTICIPATION IN RECREATION MANAGEMENT Supervised field experience in national, state, urban or private park and recreation operations. *Prerequisites:* Sophomore standing and permission. Three hours. I, II. Mr. Fuller, Mr. Gilbert, Mr. Lindsay, Mr. Greig and Mr. Schmidt.

161 SOCIOLOGY OF LEISURE (See page 289)

182 SENIOR RECREATION SEMINAR In-depth seminars on current problems in the field of public and private outdoor recreation management. *Prerequisite:* Senior standing and permission of the instructor. Two hours. Staff.

188 SPECIAL TOPICS Readings, investigations, and lecture-discussions in selected areas of recreation management. *Prerequisite:* Junior standing and permission. One to three hours. Staff.

225 ECONOMICS OF OUTDOOR RECREATION An economic analysis of demand and supply of natural resources for outdoor recreation. Emphasis on current policy issues and management of recreational business firms. *Prerequisite:* economics 11, 12, or resource economics 61. Three hours. Mr. Bevins.

Natural Resources

161 FUNDAMENTALS OF FLUID MECHANICS (3-0) (See page 202)

162 APPLIED FLUID MECHANICS (3-3) (See page 202)

163 PRINCIPLES OF HYDROLOGY (3-0) (See page 202)

Nursing

DIVISION OF HEALTH SCIENCES

Professor Milligan (Acting Director).

Professional Nursing: Professor Milligan (Acting Chairman); Associate Professors Cronin, Demers, Emerson, Forgione, Palmer, Powell, Sawyer, Schwalb; Assistant Professors Barrett, Deck, Magee, Murray, Scranton, Ure and Willard; Instructors Brearton, Burroughs; Teaching Associate Lalumiere.

Technical Nursing: Associate Professor Allen (Chairman); Assistant Professors Clarke, Foreman, Foster, Gray, Rule and Spurlock; Instructor Kranich; Teaching Associates Hall and Wright.

Professional Nursing

102 CONCEPTS OF HEALTH Study and discussion of health as a concept, health care as a science and an art, roles of providers and consumers of health care and the role of health care in society. Lectures, multimedia sessions and seminars. Opportunity for observational experiences and self directed study. Three hours. Mrs. Deck and Miss Emerson.

104 INTRODUCTION TO NURSING SKILLS Identification and application of basic nursing skills necessary to provide health care for a person in his environment. Various learning resources provided to enable the student to meet the course objectives through self-directed study. Creativity and application of knowledge emphasized. Limited supervised experience in clinical setting. Three hours. Mrs. Lalumiere and Mrs. Murray.

125-126 NURSING I AND II Development of knowledge and skills needed to assess and maintain the psychosocial, physical and physiological integrity of individuals of all ages during health and episodes of illness; the dynamics of groups (family and peer) are introduced; the presenting problems which result from the more commonly seen deviations from normal physical, psychosocial and physiological functions are explored. Laboratory experiences in institutional settings which care for episodic illness, ambulatory care facilities, and with families. *Prerequisites:* Chem 3-4, Zool 5-6, MCBI 55, H.Ec. 141 and Nurs. 104. Nine hours. Staff.

145 NURSING III Development of knowledge and skills needed for nursing individuals of all ages with complex problems involving pathophysical and psychosocial functions; implications of illness for the family will be emphasized. Development of knowledge and skills necessary in giving nursing care to families and groups with emphasis on the interrelatedness of the family and group to the environment. Laboratory experiences in homes, ambulatory care facilities, and institutional settings. Nine hours. Staff.

146 NURSING IV Development of knowledge and skills needed to assume leadership in providing nursing care for groups with emphasis on the effect of the roles of leadership, collaboration, and coordination on the interrelatedness of these groups; implications of the health team approach will be emphasized. Laboratory experiences in a variety of community settings. Nine hours. Staff.

151 NURSING RESEARCH An introduction to research in nursing. Each student will design and carry out a study of a nursing problem. Three hours. Mrs. Deck and Miss Milligan.

152 NURSING ELECTIVE Each student will undertake an approved nursing experience in a setting which meets specific needs and/or reflects particular area of interest. Six hours. Staff.

195 INDEPENDENT STUDY Independent study in nursing as indicated by student's interest. *Prerequisite:* departmental permission. One to three hours.

Technical Nursing

11-12 FUNDAMENTALS OF NURSING (3-6) A basic course in the principles of nursing care. The entire sequence focuses on nursing interventions to meet the physiological, safety, and individuality needs of all persons. Within each course, specific needs of man are presented in depth with learning opportunities to develop related skills and to adapt these skills to specific age levels. Microbiology content taught in collaboration with the Department of Microbiology in the College of Medicine is included. Concurrent experiences are planned in hospitals and community agencies. Five hours. Miss Foreman, Mrs. Hall, Rule, and Spurlock.

14 (four week summer session) *Prerequisite:* nursing 11-12, Anatomy 9, Physiology 10. Four hours. Staff.

27-28 NURSING CARE OF CHILDREN AND ADULTS (5-15), (5-15) These courses focus on nursing interventions necessary to meet changing needs of children and adults in various stages of the wellness—illness continuum. Within each course, content is presented within a framework of broad psychosocial and pathophysiological concepts in which principles of nursing care are emphasized. Clinical learning experiences focus on the adaptation and application of nursing principles to individual patient situations, including maternal and infant care and care of children and adults with varying alterations in physiological and/or psychological functioning. *Prerequisite:* Nursing 14. 27, ten hours; 28, ten hours. Mrs. Clarke, Mrs. Wright, Misses Foster, Gray and Kranich.

30 NURSING SEMINAR This course is designed to increase the student's understanding of the role of the technical nurse within the profession of nursing. Past and current trends in nursing are reviewed in relation to future goals. *Prerequisite:* Nursing 27. Two hours. Miss Allen.

Pathology

COLLEGE OF MEDICINE

Professors Clemmons, Craighead, Korson (*Acting Chairman*), Kusserow, Stark, Trainer; Associate Professors Harris, Howard, Taylor; Assistant Professors MacPherson, Tihen, Whitcomb.

101 INTRODUCTION TO HUMAN DISEASE (2-3) This is an elementary course in human pathology designed for Allied Health students. The first portion will deal

with general mechanisms of disease, to be followed by disorders of specific organs. *Prerequisite:* 1 year college level general biology or equivalent and permission of departmental chairman. Three hours. Dr. Taylor and Staff.

201 HISTOCHEMISTRY A survey of techniques used for chemical identification of cellular and tissue components, including discussion of underlying theories. *Prerequisite:* an acceptable course in cell structure (e.g., Anatomy 311, Botany 256); Chemistry 131-132; permission of the department. A course in biochemistry is strongly recommended. Credit as arranged. Not offered each year. Dr. Korson.

Pharmacology

COLLEGE OF MEDICINE

Professors Gans, Jaffe, MacMillan, Smith (Chairman) and Soyka; Associate Professors Doremus, McCormack, Reit, Robinson; Visiting Professor Maxwell.

190 PHARMACOLOGY FOR PHYSICAL THERAPY Basic pharmacology and classes of drugs which may alter the responsiveness of patients to physical therapy. Last six weeks of second semester. 2 hours. Staff.

272 TOXICOLOGY The biology of environmental intoxicants and of drug abuse. Ecologic and physiologic consequences of the dissemination of agricultural, industrial and medicinal chemicals. *Prerequisites:* organic chemistry and background in biology. Open to undergraduates. Three hours. Dr. Gans.

290 INTRODUCTION TO PHARMACOLOGY Consideration of the factors which determine the efficacy and safety of drugs with emphasis on representative agents used in medicine. A broad range of systemic pharmacology will be considered: Neuropharmacology, cardiovascular, endocrine and metabolic pharmacology and chemotherapy. *Prerequisites:* Introductory course in organic chemistry (Chem. 4, 16 or 131-132) and background in biology or health sciences. 3 hours. Staff.

Philosophy

COLLEGE OF ARTS AND SCIENCES

Professors Cahn (Chairman), Dykhuizen (emeritus) and Hall; Associate Professors Mann, Moneta, and Sher; Assistant Professors Beckett, Patricia Kitcher, Philip Kitcher, and Miller; Instructors Corcoran and Swanson.

3 LOGIC Principles and conditions of correct thinking with emphasis on the detection of fallacies of thought. Three hours. Staff.

4 ETHICS Examinations of the ideas underlying man's moral behavior to develop an acceptable and coherent theory of conduct. Three hours. Staff.

5 INTRODUCTION TO PHILOSOPHICAL PROBLEMS An introduction to philosophy and its methods through certain general problems: knowledge and experience, God, religion, the self, moral and aesthetic values, freedom and determinism. Three hours. Staff.

21, 22 INTRODUCTION TO PHILOSOPHY A systematic analysis of the thought of such leading philosophers as Plato, Aristotle, Descartes, Spinoza, Hume and Kant on such topics as Theory of Knowledge, Ethics, Political Philosophy, and Theory of Art. Three hours. Staff.

23 ORIENTAL PHILOSOPHY An examination of the main schools of Chinese and Indian philosophy including Confucianism, Taoism, Buddhism, Neo-Confucianism, and Maoism. Three hours. Mr. Swanson.

101, 102, 103 HISTORY OF PHILOSOPHY First semester: ancient philosophy; second semester: early modern philosophy through Kant; third semester: late modern philosophy (Kant through Nietzsche). *Prerequisite for 101*: one introductory course in philosophy; *prerequisite for 102*: philosophy 101; *prerequisite for 103*: philosophy 102. Three hours. Staff.

151 PHILOSOPHY AND LITERATURE Selected philosophical works and the literary works they have influenced. *Prerequisite*: one course in philosophy. Three hours. Staff.

152 PHILOSOPHY OF THE ARTS An analysis of some principal theories of art as exemplified in music, literature and painting. *Prerequisite*: one introductory course in philosophy. Three hours. Mr. Hall.

153 PHILOSOPHY OF SCIENCE Some philosophical problems closely associated with the scientific enterprise: scientific explanation, interpretations of the concept of probability, the justification of induction, causality, space and time. Emphasis on current attempts at their solution. *Prerequisite*: a course in philosophy or science. Three hours. Staff.

154 PHILOSOPHY OF RELIGION A critical analysis of the basic concepts and values which have emerged from man's religious experience. *Prerequisite*: one introductory course in philosophy, or religion 21 or 22. Three hours. Staff.

155 INTRODUCTION TO PHENOMENOLOGY A systematic study of fundamental principles of the phenomenological method such as: intentionality of consciousness, phenomenological reflection, phenomenological reduction, concept of constitution, and inner time consciousness. *Prerequisite*: philosophy 102. three hours. Ms. Moneta.

175 CHINESE RELIGION AND THOUGHT Three hours. Mr. Andrews. See Religion 175.

193, 194 COLLEGE HONORS

195, 196 SPECIAL TOPICS

197, 198 READINGS AND RESEARCH

200 PHILOSOPHY OF HISTORY An investigation of theories of history from the perspectives of both historians and philosophers. *Prerequisites*: either two advanced courses in philosophy or six hours in history. Three hours. Staff.

202 ANALYTIC PHILOSOPHY The significant problems of philosophy from the standpoint of the predominant contemporary philosophic movement in England and the United States. *Prerequisites*: philosophy 101 and 102. Three hours. Staff.

204 THEORY OF KNOWLEDGE A study of basic concepts and problems involved in explaining the possibility of human knowledge. Topics such as sense perception, memory, truth, necessity, knowledge and belief, and the possibility and limit of human knowledge will be considered. *Prerequisites:* philosophy 101 and 102. Three hours. Staff.

206 SOCIAL PHILOSOPHY The meaning and values inherent in social life. *Prerequisites:* philosophy 101 and 102. Three hours. Staff.

207 METAPHYSICS Current and traditional metaphysical problems such as the concept of change, the existence and nature of God, the self, and the world. *Prerequisites:* philosophy 101 and 102. Three hours. Staff.

208 THEORY OF VALUE An analysis of the nature of value and the nature of experience of the various realms of value. *Prerequisites:* philosophy 101 and 102. Three hours. Staff.

209 AMERICAN PHILOSOPHY The thought of such leading American philosophers as Peirce, James, Royce, Santayana, Dewey and Whitehead. *Prerequisites:* philosophy 101 and 102. Three hours. Mr. Miller.

210 PHENOMENOLOGICAL THINKERS A critical and intensive investigation of the thought of a major twentieth century phenomenologist, e.g., Husserl, Heidegger, or Merleau-Ponty. *Prerequisites:* philosophy 155 or 101 and 102. Three hours. Ms. Moneta.

211 NINETEENTH-CENTURY PHILOSOPHY A systematic analysis of the contributions to philosophical thought of such thinkers as Fichte, Schelling, Hegel, Schopenhauer, Nietzsche, Mill, Kierkegaard, Dilthey, and Marx. *Prerequisites:* philosophy 101 and 102. Three hours. Staff.

212 EXISTENTIALISM Existentialism, its sources and its relation to literature and to the arts. *Prerequisites:* philosophy 101 and 102. Three hours. Staff.

213 PHILOSOPHY OF MIND An investigation of the mutually exclusive theories of psycho-physical interactionism, logical behaviorism, neural identity materialism, and double aspect theory. *Prerequisites:* philosophy 101 and 102. Three hours. Staff.

214 INTELLECTUAL BACKGROUNDS OF MODERN LIFE Intellectual movements which have influenced the thought and life of today. *Prerequisites:* philosophy 101 and 102. Three hours. Staff.

221 TAO TE CHING A systematic study of one of the most important texts of Taoism and of the English translation of the text. *Prerequisites:* philosophy 23, 101 and 102. Three hours. Mr. Swanson.

222 I CHING OR BOOK OF CHANGES A systematic study of one of the most difficult and most important texts in the Oriental tradition. *Prerequisites:* philosophy 23, 101 and 102. Three hours. Mr. Swanson.

281, 282 SEMINAR Selected topics in philosophy, determined according to the interest of students and instructor. *Prerequisites:* philosophy 101 and 102. Three hours. Staff.

297, 298 READINGS AND RESEARCH Independent study with an instructor on a philosopher or philosophical problem of the student's choice. *Prerequisites:* philosophy 101 and 102. Three hours. Staff.

For economic philosophy, see economics 295; for political philosophy, see political science 211, 212; and for mathematical logic, see mathematics 259, 260.

Physical Therapy

SCHOOL OF ALLIED HEALTH SCIENCES

Associate Professor Feitelberg (Chairperson, Department of Physical Therapy); Associate Professor Page; Assistant Professors Anderson and Moffroid; Instructor Sampson; Clinical Assistant Professors Clawson, Corbin, DeAngelis, Parry, Smith; Clinical Instructors Bieber, Kane, Main, Marshall, Nalette, Sulima, Tandy.

21 PHYSICAL THERAPY I History and current trends of the profession with emphasis on the medical-ethical-legal aspects of practice. The role of the therapist in treatment, the health care environment and as a team member. Supervised observation in approved clinical centers. Two hours. Mr. Feitelberg and faculty.

22-121-122-151-152 PHYSICAL THERAPY PROCEDURES II-VI This sequence of courses develops increasing levels of sophistication in evaluation and treatment procedures to prepare the student for professional qualification. Included are procedures such as massage, physical agents, therapeutic exercise and physical rehabilitation, culminating with the investigation of more complex medical problems and their management. Lecture, laboratory, clinical demonstrations and clinical experience. (II: 2 hours; III: 3 hours; IV: 5 hours; V: 5 hours; VI: 3 hours) Miss Anderson, Miss Page and faculty.

111 KINESIOLOGY The study of normal posture and movement. Principles of anatomy, biomechanics and neurophysiology are studied in relation to static and dynamic components of motion. *Prerequisite:* sophomore Physical Therapy standing or permission of the instructor. Three hours. Mrs. Moffroid.

131-132-133-134 CLINICAL MEDICINE I-IV Management of disease processes in the major medical specialties such as General Medicine, Orthopaedics, Neurology, Pediatrics and Rehabilitation Medicine. Utilization of the problem oriented medical record as a basis for understanding the concept of comprehensive care. Pharmacological principles and considerations in patient care. Lecture and clinical presentations. A continuum of four semesters. (131: 1 hour; 132: 2 hours; 133: 2 hours; 134: 2 hours) Faculty, College of Medicine.

142 INDEPENDENT STUDY The selection and development of a topic for investigation using an assigned faculty member as a preceptor. Seminar sessions for guidance and problem solving on related issues. Two hours. Faculty.

144 HEALTH CARE SYSTEMS An overview of the present health care system, with emphasis on issues and aspects that are specifically related to physical therapists. Lecture, discussion, written projects. Three hours. Mr. Sampson and faculty.

161 PSYCHOLOGICAL ASPECTS OF PHYSICAL DISABILITY Consideration of the reactions to illness and disability and associated emotional and personality changes. Emphasis on developing methods to modify behavior for effective treatment and teaching of the disabled and the family. Two hours. TBA

172 PRINCIPLES OF ORGANIZATION AND ADMINISTRATION Analysis of current designs and methods used in existing physical therapy facilities. Opportunity to investigate concepts for projecting new patterns to meet the needs of future health care systems. Study of communication theories fundamental to the process of

change. Group activity to design alternate models based on problem solving. Three hours. Mr. Feitelberg and clinical faculty.

173. **SCIENTIFIC INQUIRY I** Introduction to clinical inquiry. Basic statistics of central tendency, dispersion, correlation and analysis of variance. Current literature provides a framework for discussion of these statistical applications. Two hours. Mrs. Moffroid.

174. **PRINCIPLES OF EDUCATION** Introduction to learning theory as applicable to Physical Therapy. Opportunity to become familiar with instructional media, design and participate in educational units. Two hours. Mr. Sampson and faculty.

176. **SCIENTIFIC INQUIRY II** *Prerequisite:* P.T. 173 or a statistics course. Clinical inquiry is presented as a methodology. Two way analysis of variance is learned. The student plans an experimental design and completes it with mock data. The administrative planning of clinical inquiry is explored and methods are discussed for disseminating information. Two hours. Mrs. Moffroid.

128. **CLINICAL EDUCATION I** Students are assigned to a variety of approved clinical centers for supervised observation and participation. Learning experiences are designed in cooperation with the clinical faculty in keeping with the level of competency acquired. Three hours. (Full time, 6 week period, May-June) Mr. Sampson and clinical faculty.

158. **CLINICAL EDUCATION II** A continuation of Clinical Education I. At this level students fully participate in the evaluation and treatment of patients according to the objectives of the facility. A wide variety of opportunities are planned within the facility and community. Students are assigned full time to two facilities during this period. Five hours. (Full time 10 week period, January-March) Mr. Sampson and clinical faculty.

Physics

COLLEGE OF ARTS AND SCIENCES

Professors Crowell (Chairman), Detenbeck, Juenker, Krizan, Nyborg and Scarfone; Associate Professors Brown and Cohen; Assistant Professors Nagy and Sachs.

1. **CELESTIAL PHYSICS** Description of various historical models of the observable universe. Nature of light and description of optical instruments, especially the telescope. Concept of space and time, Einstein's Relativity. Three hours. Mr. Crowell.

2a, b, c. **TOPICS IN PHYSICAL SCIENCE** A sequence of three four-week mini-courses offered for one credit each on topics to be announced in advance. Students may enroll in from one to three credits. Limited use of algebra. No prerequisites. Staff.

3. **INTRODUCTORY PHYSICS (3-2)** A one-semester laboratory course in basic physics, designed particularly to meet the needs of students in the programs in the agricultural and health sciences. Four hours. Mr. Nagy.

11, 12 **ELEMENTARY PHYSICS (3-2)** A survey of the principles of classical and modern physics. Recommended for students not concentrating in science, mathematics or premedical programs. *Prerequisite:* 3 or 11 for 12, secondary school algebra and trigonometry. Four hours. Staff.

15, 16 **GENERAL PHYSICS (3-2)** Introduction to the principles of physics for students concentrating in the natural sciences. Recommended for students in premedical programs. *Prerequisite:* 15 for 16; credit in mathematics 26 or concurrent enrollment or credit in Mathematics 11 or 13 for 15. Four hours. Staff.

24, 25 **FUNDAMENTALS OF PHYSICS (3-2, 3-2)** For students concentrating in engineering or a physical science. *Prerequisite:* for 24, Mathematics 11 or 13 and credit or concurrent enrollment in Mathematics 12 or 14; for 25, 24 or 18 and credit or concurrent enrollment in Mathematics 121 or 123. Four and four hours. Staff.

128 **INTRODUCTORY MODERN PHYSICS (3-2)** An introduction to the theory of relativity and to modern descriptions of radiation, the electron, the atom, the atomic nucleus, and elementary particles. *Prerequisite:* 16 or 25 and credit or concurrent enrollment in mathematics 121 or 123. Four hours. Staff.

193, 194 **COLLEGE HONORS**

195, 196 **SPECIAL TOPICS**

197, 198 **READINGS AND RESEARCH**

201, 202 **EXPERIMENTAL PHYSICS (1-3)** Experiments in classical and modern physics. Each student selects laboratory experiments appropriate to his background and interests. The course may be entered at the beginning of either semester and repeated for credit up to a maximum of four semesters. *Prerequisite:* 16 or 128 and mathematics 121 or 123. Junior standing. Three hours. Staff.

211 **MECHANICS** Newtonian dynamics of particles and systems of particles, with applications to problems of special importance, such as driven and coupled harmonic oscillators and central field trajectories. *Prerequisite:* 16 or 25, mathematics 121 or 123. Three hours. Mr. Crowell.

213 **ELECTRICITY AND MAGNETISM** Fundamental principles of electricity and magnetism; electrostatic fields, and magnetic fields of steady currents. Electrical and magnetic properties of matter and electromagnetic energy relationships. *Prerequisite:* 16 or 25, mathematics 121 or 123. Three hours. Mr. Nagy.

214 **ELECTROMAGNETISM AND RELATIVITY** An introduction to time dependent electromagnetic fields. Maxwell's equations in space and matter. Electromagnetism as a relativistic phenomenon. Special relativity including an introduction to four-vectors. *Prerequisite:* 213. Three hours. Mr. Brown. Alternate years: 1975-76.

216 **INTRODUCTION TO MATHEMATICAL PHYSICS** Introduction to basic mathematical methods of theoretical physics. Particular emphasis on partial differential equations, especially the wave equation. *Prerequisite:* 211 or 213. Three hours. Mr. Sachs. Alternate years: 1974-75.

220 **BIOLOGICAL PHYSICS (3-2)** Physical laws, concepts and methods discussed with respect to their reference to biology. *Prerequisite:* 12 or 16, chemistry 2, mathematics 12. Four hours. Mr. Nyborg.

222 **ADVANCED BIOLOGICAL PHYSICS (3-2)** Sound and electromagnetic waves; ionizing particles and radiation. Interaction of these physical agents with biological systems. Physical properties of macromolecules and their aggregates. *Pre-*

requisite: chemistry 2; mathematics 121; and experience in applying differential equations. Departmental permission required. Four hours. Mr. Nyborg. Alternate years: 1974-75.

254 ATOMIC AND NUCLEAR PHYSICS Phenomenological study of electronic structure of atoms. Development of quantum theory. Structure of the nucleus and properties of elementary particles. *Prerequisite:* 128. Three hours. Mr. Detenbeck. Alternate years: 1974-75.

265a, b, c THERMAL PHYSICS A sequence of three units or mini-courses: 265a, Thermodynamics; 265b, Kinetic Theory; 265c, Statistical Mechanics. Students may enroll in from one to three units for one credit each. *Prerequisites:* 128 or 16 and Mathematics 121 for 265a; 265a or other thermodynamics course for 265b; 265b for 265c. One to three credits. Mr. Juenker. Alternate years: 1974-75.

273 INTRODUCTORY QUANTUM MECHANICS Introduction to non-relativistic quantum mechanics. Schroedinger equation and applications to simple systems. *Prerequisites:* 128 and 211. Three hours. Mr. Scarfone.

Physiology and Biophysics

COLLEGE OF MEDICINE

Professors Alpert (Chairman), Chambers, McCrorey, Parsons; Associate Professors Hendley, Low, Webb, Whitehorn; Assistant Professors Halpern, Hamrell, Gibbons.

10 INTRODUCTION TO HUMAN PHYSIOLOGY A Systems Approach to Biology. This course will provide a physical-chemical basis for an understanding of modern human physiology. Specific emphasis will be placed on the functioning of the various organ systems and the interrelationships among these systems. Time will be spent in discussing how the intact organism uses the systems for maintaining its own integrity and for withstanding the stresses of the environment. There will be a focus on the skeletal-neuro-muscular system; cardiovascular system; respiratory system; gastrointestinal system; endocrine system; nervous system, and the renal system and body fluids. Three hours. Alpert, Gibbons.

101-102 PHYSIOLOGY AND BIOPHYSICS (5-5) The scientific basis of mammalian (especially human) physiology and biophysics is presented for physical therapy students as well as other undergraduate and graduate students requiring an in depth working knowledge of structure and function. Emphasis is placed on the broad physical, chemical and biological principles underlying the performance of the subcellular components, cells, tissues, organs and multi-organ systems. Time will be spent in discussing how the intact organism maintains its own integrity despite the environmental stresses to which it is subjected. The laboratory will supplement all of these areas including experiments using human volunteer subjects for studying the detailed interaction of the pulmonary, renal, and cardiovascular systems during a variety of stresses. *Prerequisites or concurrent courses:* Chemistry 3 and 16, Physics 5 and 6, and one semester of mathematics or permission of instructor. Two semesters, 5 hours per semester. Staff.

Plant and Soil Science

COLLEGE OF AGRICULTURE

Professors Wiggins (Chairman), Bartlett, and MacCollom; Associate Professors Boyce, Evert, Flanagan, McIntosh, Parker, Pellett, and Wood; Assistant Professor Magdoff; Lecturers Flinn, Watson, and Whipkey; Adjunct Professor Calahan; Adjunct Associate Professor Benoit; Teaching Associate Bruckel.

10 HOME AND GARDEN HORTICULTURE Planning, selecting, and maintaining shrubs, trees, flowers, lawns, fruits, and vegetables around the home. Designed primarily for non-agricultural students. Three hours. Mr. Wiggins and staff.

11 PRINCIPLES OF PLANT SCIENCE Principles and practices involved in the culture, management, and utilization of economically important horticultural and agronomic crops. Three hours. Mr. Boyce.

14 SCIENTIFIC PHOTOGRAPHY Introduction to scientific still photography for the student and researcher in the plant sciences. Three hours. Mr. Wood.

31 INSECTS—MAN'S GREATEST COMPETITOR Insects, their evolution, ecology, control and impact on history and culture. Three hours. Mr. MacCollom.

61 INTRODUCTORY SOIL SCIENCE (3-3) Introductory study of the nature and properties of soils and how they serve as a media for plant growth. *Prerequisite:* One semester of chemistry. Four hours. Mr. Magdoff.

71 NATURAL RESOURCE CONSERVATION Systematic appraisal of the nation's resources; including soil, water, atmosphere, forest, wildlife, and mineral. Three hours. Mr. Flanagan.

106 INSECT PEST MANAGEMENT (3-2) Survey of the major insect orders, and methods for controlling injurious species. *Prerequisite:* 11. Four hours. Mr. Parker.

107 FOREST ENTOMOLOGY (2-2) Ecology and population dynamics of insects affecting forests and forest products. Insect control by silvicultural, biotic and chemical means. *Prerequisite:* junior standing in forestry or departmental permission. Three hours. Mr. MacCollom.

109 AGRICULTURAL HYDROLOGY A descriptive treatment of applied hydrology specifically concerned with the occurrence, distribution, and movement of water in the agricultural environment. *Prerequisites:* 61 and Math 2 or 9. Three hours. Mr. Whipkey.

111 WORLD CROPS Effect of environment, nutrition, and management on crop growth, distribution and production of world food supplies. *Prerequisite:* 11 or Bot 4. Three hours. Mr. Wood.

122 SMALL FRUIT CROPS (2-3) Principles of small fruit production, including propagation, culture, management, and harvesting. *Prerequisite:* 11. Three hours. Mr. Boyce.

125 ORNAMENTAL HORTICULTURE (3-3) Identification, climatic requirements, cultural management, and use of ornamental plant materials in landscape plantings. *Prerequisite:* 11. Four hours. Mr. Bruckel.

138 **PLANT PROPAGATION (2-4)** Principles and practices involved in propagating herbaceous and woody plants by seeds, division, layering, cuttings, budding, grafting, and tissue culture. *Prerequisite:* 11. Three hours. Mr. Evert.

145 **TURFGRASSES (2-3)** Establishment, maintenance and utilization of turf for lawns, parks, athletic fields, airports, cemeteries, roadsides, golf courses, and ski slopes. *Prerequisite:* 11. Three hours. Mr. Wood.

151 **LANDSCAPE DESIGN I (2-3)** An introduction to the theory of landscape design and its relationship to man, man-made structures, and the natural environment. *Prerequisites:* 125 and ME 1 or Art 9. Three hours. Mr. Flinn.

152 **LANDSCAPE DESIGN II (2-6)** Application of landscape design theory to a wide range of land use and environmental problems. *Prerequisite:* 151. Four hours. Mr. Flinn.

162 **SOIL FERTILITY AND MANAGEMENT** Principles of soil management including soil testing methods and interpretations, fertilizer manufacture, usage, and management practices. *Prerequisite:* 61. Three hours. Mr. McIntosh.

191 **UNDERGRADUATE SPECIAL TOPICS** Lectures, laboratories, readings, field projects, surveys or research designed to provide specialized experience in horticulture, agronomy, soils, or plant environment. *Prerequisite:* permission. One to fifteen hours. Staff.

201 **MICROMETEOROLOGY** Theoretical and practical considerations of the micrometeorological factors that affect plant growth and agricultural practices. *Prerequisite:* 11. Three hours. Mr. Benoit. Alternate years, 1975-76.

204 **PLANT RESEARCH TECHNIQUES (2-3)** Methods of conducting research with plants including the organizing and planning of experiments. *Prerequisite:* 11 and Botany 104. Three hours. Mr. Wiggans. Alternate years, 1975-76.

205 **MINERAL NUTRITION OF PLANTS** Role of essential elements for plant growth including classical and modern approaches to the study of ion availability and transport. *Prerequisite:* botany 104. Three hours. Mr. Bartlett and botany, forestry, and plant and soil science staff. Alternate years, 1975-76.

207 **WATER RELATIONS OF PLANTS** (See forestry 207) Three hours. Mr. Donnelly and botany and plant and soil science staff. Alternate years, 1974-75.

221 **ADVANCED TREE FRUIT CULTURE (2-3)** Theory and practice of modern commercial fruit science. Nutrition and cultural responses to various management practices. *Prerequisites:* 11 and 61. Three hours. Mr. Calahan. Alternate years, 1974-75.

232 **BIOLOGICAL CONTROL OF INSECT PESTS (2-2)** A survey of the biological agents used in controlling insects and related arthropods, and their application and limitations. *Prerequisite:* an intermediate course in Entomology. Three hours.¹ Mr. MacCollom.

234 **MEDICAL ENTOMOLOGY (2-2)** The relationships of insects and related arthropods to the causation of pathological conditions in man and animals. *Prerequisite:* an intermediate course in Entomology. Three hours.¹ Mr. Nielsen and staff. Alternate years, 1974-75.

261 **SOIL CLASSIFICATION AND LAND USE** Classification of soils throughout the world as they relate to soil development and land use. Three Saturday field

¹Graduate credit pending.

trips. *Prerequisite*: 61 or a total of six hours in ecology, geography, or geology. Three hours. Mr. Bartlett and Mr. Watson. Alternate years, 1974-75.

264 **SOIL CHEMISTRY (3-3)** Chemistry and biology of soils affecting plant growth including the properties of clays and organic matter. *Prerequisite*: 61. Four hours. Mr. Bartlett. Alternate years, 1975-76.

266 **SOIL PHYSICS (2-3)** Mathematical and physical principles of the soil-water-plant interaction and its relationship to production and management. *Prerequisites*: 61 and one semester of physics. Three hours. Mr. Benoit. Alternate years, 1975-76.

267 **SOIL AND WATER POLLUTION** The chemistry and biology of soil and water pollution, sources of pollutants, and organisms involved. Land disposal of urban and rural wastes. *Prerequisites*: 61 and a course in biological science. Three hours. Mr. Magdoff.

281 **SEMINAR** Presentation and discussion of papers on selected topics of current interest by students and staff. *Prerequisite*: senior standing. One hour. Staff.

Political Science

COLLEGE OF ARTS AND SCIENCES

Professor Dellin, Gould, Haugen, Hilberg, G. T. Little, and Staron; Associate Professors Pacy (Acting Chairman), Simon, Warner, and Wertheimer; Assistant Professors Brewer, Flannery, Frankovic, Grabosky, Kinnard, Nelson, and Rosenbloom; Instructor Diamond.

11 **INTRODUCTION TO POLITICAL SCIENCE** Elements of political science. Three hours. Staff.

13 **INTRODUCTION TO POLITICAL THEORY** An introduction to empirical theories of politics, the purpose of normative theory, and the analysis of basic political concepts. Three hours. Mr. Wertheimer.

21 **AMERICAN POLITICAL SYSTEMS** Institutions, processes, and problems of American government. Three hours. Mr. Warner and Staff.

51 **INTERNATIONAL RELATIONS** The state as actor in international relations. Global divisions and problems. Three hours. Messrs. Hilberg, Kinnard, and Pacy.

71 **COMPARATIVE POLITICAL SYSTEMS** Introduction to the method and theories of comparative politics focusing upon selected contrasting political systems. Three hours. Mr. Flannery.

81 **POLITICAL BEHAVIOR** An analysis of how people react to political situations and the ways in which their behavior may be understood. Three hours. Messrs. Brewer and Nelson.

96 **SEMINAR** Selected topics in political science. Three hours. Staff.

121 **LAW AND POLITICS** The distribution of justice in American society. The nature of the legal profession and its effect on civil and criminal litigation. Re-

cruitment and decision making behavior of judges and the functions of courts as institutions of conflict resolution. Three hours. Mr. Grabosky.

171 WESTERN EUROPEAN POLITICAL SYSTEMS An examination of the British, German, and French political systems. Three hours. Mr. Staron.

172 RUSSIAN AND EASTERN EUROPEAN POLITICAL SYSTEMS An examination of the Russian and some other Eastern European Communist political systems. Three hours. Mr. Staron.

173 CANADIAN AND COMMONWEALTH GOVERNMENTS Emphasis on Canada and Commonwealth cooperation. Three hours. Mr. Haugen.

174 LATIN AMERICAN POLITICAL SYSTEMS Analysis of the formal and informal political structure of Latin American states with emphasis upon contemporary developments. Three hours. Mr. Gould.

175, 176 ASIAN POLITICAL SYSTEMS The development of political institutions and processes in the 20th century with brief historical introductions. First semester: East Asia. Second semester: South and Southeast Asia. Three hours. Mr. Little.

179 CONTEMPORARY JEWRY Emancipation in the diaspora; annihilation under the Nazi regime; the establishment of Israel and its wars with Arab states. Three hours. Mr. Hilberg.

181 POLITICAL LEADERSHIP Methods of identifying leaders, their relationships with non-leaders and with one another, their impact on public policy, and their personalities and social backgrounds. Empirical theories about political leadership. Three hours. Mr. Nelson.

193, 194 COLLEGE HONORS

195, 196 SPECIAL TOPICS

197, 198 READINGS AND RESEARCH

211, 212 HISTORY OF POLITICAL THOUGHT First semester: development of political thought from Plato to Burke. Second semester: Political thought of the 19th and 20th centuries with emphasis on socialist ideologies from Marx to Marcuse. *Prerequisite*: six hours in political science. Three hours. Mr. Staron.

213 CONTEMPORARY POLITICAL THOUGHT A discussion of the writings of several twentieth-century political thinkers, including writings in related fields such as psychology and economics. *Prerequisite*: six hours in political science. Three hours. Mr. Wertheimer.

216 AMERICAN POLITICAL THOUGHT American political thought from the colonial period to recent times. *Prerequisite*: six hours in political science. Three hours. Mr. Wertheimer.

221, 222 CONSTITUTIONAL LAW First semester: judicial review, federalism, citizenship and suffrage, taxing power, commerce power. Second semester: Bill of Rights, Due Process, Equal Protection. *Prerequisite*: six hours in political science. Three hours. Mr. Gould.

226 ADMINISTRATIVE LAW The politics of federal regulation, regulatory agencies and processes, and leading constitutional cases in administrative law. Alternate years. *Prerequisite*: six hours in political science. Three hours. Mr. Rosenbloom.

227, 228 **INTERNATIONAL LAW** Principles and applications of public international law. *Prerequisite:* Six hours in political science. Three hours. Mr. Little.

231 **THE LEGISLATIVE PROCESS** Congressional and parliamentary organization and procedure. *Prerequisite:* six hours in political science. Three hours. Mr. Haugen.

232 **LAWMAKING AND PUBLIC POLICY** Influence of the executive and problems of congressional and parliamentary control. *Prerequisite:* six hours in political science. Three hours. Mr. Haugen.

233 **THE NATIONAL EXECUTIVE** Analysis of the functions and organizations of the Presidency and the bureaucracy in American national government. *Prerequisite:* six hours in political science. Three hours. Mr. Rosenbloom.

235 **DEFENSE POLITICS** U.S. defense politics, policies, and processes. Civil-military relations, strategic policy, arms control, defense-industrial complex, defense budget. *Prerequisite:* six hours in political science. Three hours. Mr. Kinnard.

239 **AMERICAN POLITICS** An examination of the politics of decision-making in the American political system. *Prerequisite:* six hours in political science. Three hours. Mr. Grabosky.

241 **PUBLIC ADMINISTRATION** The Federal government in action. *Prerequisite:* six hours in political science. Three hours. Mr. Warner.

242 **PROBLEMS OF BUREAUCRACY** Bureaucracy and bureau pathology, scientific management, human relations, decision-making, and leadership in the context of public organization. *Prerequisite:* six hours in political science. Three hours. Mr. Rosenbloom.

250 **CRAFT OF DIPLOMACY** Emphasis on experiences and reflections of diplomatic personalities, supplemented by studies of specialists. *Prerequisite:* six hours in political science. Three hours. Mr. Pacy.

251, 252 **AMERICAN FOREIGN POLICY** First semester: constitutional principles, institutional factors, and historic traditions in the formation of foreign policy. Second semester: contemporary policies toward specified countries. *Prerequisite:* six hours in political science. Three hours. Messrs. Kinnard and Hilberg.

256 **INTERNATIONAL ORGANIZATION** Theory and practice in supranational institutions. *Prerequisite:* six hours in political science. Three hours. Mr. Pacy.

257 **POLITICAL GEOGRAPHY** See Geography 257. Three hours. Mr. Miles.

258 **PROBLEMS OF COMMUNISM** See Economics 258. Three hours. Mr. Dellin.

261 **URBAN GOVERNMENT AND POLITICS** An analysis of metropolitan areas in terms of their governments, problems, and roles. *Prerequisite:* six hours in political science. Three hours. Ms. Diamond.

262 **URBAN PUBLIC ORDER** Urban crime as a political issue. Institutions of crime control. Urban police systems and law enforcement. *Prerequisite:* six hours in political science. Three hours. Mr. Grabosky.

264 **STATE ADMINISTRATION** Problems in planning, policy development, and program coordination. *Prerequisite:* six hours in political science. Three hours. Mr. Haugen.

265 **INTERGOVERNMENTAL RELATIONS** Problems of the Federal system. National-state-local cooperative administration of selected public functions. *Prerequisite:* six hours in political science. Three hours. Mr. Haugen.

273 **COMPARATIVE POLITICAL ANALYSIS** Selected topics. *Prerequisite:* six hours in political science. Three hours. Mr. Flannery.

276 **MASSSES AND ELITES** Structural and attitudinal linkages between governors and governed. The impact of integration or isolation on the political system. Discussion of modern as well as more traditional societies. *Prerequisite:* permission of the instructor. Three hours. Mr. Brewer.

277 **SOVIET POLITICS** See History 277. Three hours. Mr. Daniels.

278 **FOREIGN POLICY OF THE USSR** Emphasizing post 1960 developments. *Prerequisite:* junior standing or consent of instructor. Three hours. Mr. Flannery.

281 **POLITICAL PARTIES** Analysis of political parties with special emphasis upon voting behavior and campaign techniques. *Prerequisite:* six hours in political science. Three hours. Mr. Nelson.

283 **SCOPE AND METHODS OF POLITICAL SCIENCE** Approaches, sources of information, research methods and systematization in the study of political phenomena. Open to senior majors and graduate students only. Three hours. Mr. Grabosky.

291, 292 **READINGS AND RESEARCH** For advanced undergraduates and graduate students. Three hours. Staff.

295, 296 **SEMINAR** Selected topics in Political Science. *Prerequisite:* six hours in political science. Three hours. Staff.

Psychology

COLLEGE OF ARTS AND SCIENCES

Professors Albee, Ansbacher, Burchard (Acting Chairman), Forgays, Joffe, Lawson, Leitenberg and Perrine; Associate Professors Hasazi, Howell, Musty, Patterson; Assistant Professors Gordon, Kapp, Kent, Kessler, Leff and Rolf; Instructor Rodd; Adjunct Professor Grams; Adjunct Associate Professors Conquest, McKenzie; Adjunct Assistant Professors Damkot, Dietzel, Does, Goldstein and Thomson.

Note: All courses numbered 200 or above have 1, 109, 110, and 119 as prerequisites, or require permission of the instructor.

1 **GENERAL PSYCHOLOGY** Introduction to the entire field, emphasizing the normal adult human being. Three hours. Mr. Forgays.

5 **PSYCHOLOGICAL STATISTICS** Statistical technique and research design pertinent to the behavioral scientist. A calculation laboratory is provided. *Prerequisite:* 1. Three hours. Messrs. Gordon and Howell.

100 **BEHAVIOR MODIFICATION** A survey of techniques for the manipulation and control of human behavior, and evaluation of their effectiveness. *Prerequisite:* 1. Three hours. Messrs. Leitenberg and Burchard.

109, 110 **PRINCIPLES OF PSYCHOLOGICAL METHODOLOGY AND RESEARCH** (2-4) This course prepares students to understand and to do competent research in a variety of areas of psychology. The focus is upon designs, methodologies, and statistical procedures essential for psychological research. Laboratory experiences are included. *Prerequisite:* 1. Four hours. Messrs. Gordon, Howell, Joffe, and Musty.

119 **SYSTEMATIC PSYCHOLOGY** A comparative study of the leading contemporary schools of psychological thought. *Prerequisite:* 1 sophomore standing. Three hours. Messrs. Lawson and Musty.

121 **BIOPSYCHOLOGY** Principles of the biological bases of behavior are introduced through classical and contemporary issues in field, including an introduction to the nervous system, physiological and behavioral effects of drugs, chemical bases of behavioral disorders, hormonal control of behavior, intercerebral disorders of behavior, voluntary control of bodily functions, and possible physiological bases of extrasensory perception. *Prerequisite:* 1. Three hours. Messrs. Kapp and Musty.

130 **SOCIAL PSYCHOLOGY** A psychological approach to social phenomena with emphasis on the concepts and methods used in the study of the behavior of individuals in various social situations. *Prerequisite:* 1. Three hours. Mr. Leff, Ms. Kent.

150 **PERSONALITY** Individual and life problems from the field-theoretical and phenomenological approach with emphasis on Alfred Adler's viewpoint. *Prerequisite:* 1. Three hours. Messrs. Ansbacher and Kessler.

151 **CHILD PSYCHOLOGY** Behavioral development of the child from conception to adolescence. Emphasis is on basic learning processes and their relationship to selected aspects of development. *Prerequisite:* 1. Three hours. Mr. Forgas.

152 **ABNORMAL PSYCHOLOGY** The more unusual mental processes; methods of observing them and interpreting them; their bearing on our understanding of the normal mind. *Prerequisite:* 1. Three hours. Messrs. Kessler and Albee.

193, 194 **COLLEGE HONORS**

195, 196 **SPECIAL TOPICS**

197, 198 **RESEARCH** Individual research under staff direction. *Prerequisite:* Departmental permission. Three or six hours. Staff.

200 **ADVANCED BEHAVIOR MODIFICATION** Application of technique for the manipulation and control of human behavior in a variety of educational and social situations involving the collection and analysis of behavioral data. *Prerequisite:* 100. Three hours. Messrs. Burchard and Hasazi.

205 **LEARNING** Basic laws of the learning process as revealed by controlled experiments. Laboratory experiences are provided and students may undertake original experiments. Three hours. Mr. Howell.

206 **MOTIVATION AND EMOTION** Nature and development of motives, emotions and their relation to other psychological processes. Three hours. Mr. Joffe.

210 **SENSORY PERCEPTION** An introduction to the sensory basis of perception. Emphasis is on methodology and research literature; development of an original experiment. Three hours. Mr. Lawson.

220 **COMPARATIVE PSYCHOLOGY** Behavior of animals under controlled experimental conditions and in their natural environments. Consideration of behavior similarities and differences at various levels of the phyletic scale. Three hours. Mr. Joffe.

221 **PHYSIOLOGICAL PSYCHOLOGY I** The structure and function of the mammalian nervous system, with emphasis upon neurological correlates of behavior and receptor mechanisms. Individual laboratory experience. Four hours. Mr. Musty.

222 **PHYSIOLOGICAL PSYCHOLOGY II** The study of the role of central nervous system mechanisms in the determination of innate behavior, arousal, internal inhibition, and learning. Individual laboratory experience. *Prerequisite:* 221. Four hours. Mr. Kapp.

230 **EXPERIMENTAL SOCIAL PSYCHOLOGY** Advanced survey covering current research in various fields of social psychology. Three hours. Mr. Leff.

231 **SOCIAL PERCEPTION** Experimental and theoretical study of the phenomena of the human perceptual process, with emphasis on the role of social, motivational, and learning factors. Students may undertake original experiments. Three hours. Mr. Perrine.

236 **THINKING** A critical review of the experimental investigation of thought processes. Three hours. Messrs. Gordon and Howell.

239 **THE SOCIAL USE AND ABUSE OF ALCOHOL** An intensive and critical analysis of the research literature concerning both the normative and deviant use of alcohol. Emphasis will be placed upon methodological aspects of original studies and upon psychological-biographical correlates of drinking patterns, injury on and off the highway, alcoholism, and feasible counter-measures. Three hours. Mr. Perrine.

251 **BEHAVIOR DISORDERS OF CHILDHOOD** Covers a wide range of topics from brain damage to childhood psychoses and nightmares. Each problem behavior will be considered in the context of normal child development. Three hours. Messrs. Rolf and Hasazi.

252 **INTRODUCTION TO CLINICAL PSYCHOLOGY** This course is a study of the basic principles of interviewing, testing, assessment from life situations, and report writing. There is an examination of the most common approaches to psychotherapy, such as the client-centered, habit change, cognitive change, emotional change, interpersonal relations, and group therapy approaches. Three hours. Mr. Kessler.

281-282 **SEMINAR** Review and discussion of current psychological research. One hour. Staff.

295, 296 **CONTEMPORARY TOPICS** Three hours. Staff.

Radiologic Technology

SCHOOL OF ALLIED HEALTH SCIENCES

Assistant Professor Izzo (Chairperson); Instructors Falby, Marschke, Randall; Adjunct Instructors Lacasse, Cunningham, Lessard

1, 2 CLINICAL ORIENTATION (1-6) Observation and participation in the Radiology Department of the Medical Center Hospital of Vermont combined with lectures, laboratories, and independent study. *Prerequisite:* enrollment in Radiologic Technology. Three credits each. Staff.

12 INTRODUCTORY RADIOLOGIC SCIENCE (3-0) Introduction to basic principles of ionizing radiation, and protection methods for personnel and patients. *Prerequisites:* physics 3 and math 9. Three credits. Mr. Izzo.

14 RADIOPATHOLOGY (3-0) Study of etiology and radiographic manifestations of non-neoplastic pathology. *Prerequisite:* RT 1 and anatomy 9. Three credits. Mr. Falby.

31 RADIOGRAPHIC SCIENCE (3-0) Study of principles and methods of obtaining optimum radiographs, including topics of x-ray film and processing, image formation, tomography. *Prerequisite:* RT 12. Three credits. Mr. Falby.

33, 34 RADIOGRAPHIC TECHNIQUES (2-2) Lecture, demonstration, and independent study of techniques for accurate patient positioning to obtain optimum radiographic visualization; includes special procedures. *Prerequisites:* anatomy 9 and RT 2 for 33. Three credits each. Mr. Falby, Ms. Randall.

41, 42, 44 NUCLEAR MEDICINE TECHNOLOGY I, II, III (2-2) Study of radio-pharmaceuticals, instrumentation, and clinical techniques for determination of pathology related to body structure and function. *Prerequisite:* anatomy 9 and physiology 10 for 41, RT 12 for 42, and RT 42 for 44. Three credits each. Mr. Izzo.

51, 52 RADIATION THERAPY TECHNOLOGY (2-2) Study of physical principles and clinical techniques involved in the therapeutic use of ionizing radiation for malignant disease; including treatment planning, computer techniques, and dosimetry. *Prerequisite:* RT 12 for 51, RT 51 for 52. Three credits each. Mr. Marschke.

54 CLINICAL ONCOLOGY (3-0) Study of various types of malignant neoplasms and the methods of treatment. *Prerequisite:* anatomy 9 and sophomore standing. Three credits. Mr. Marschke.

71, 72 SENIOR CLINICAL PRACTICUM Continuation of RT 1, 2 in the field of specialization. Variable credits. Staff.

91, 92 SPECIAL RADIOLOGIC PROJECTS Independent projects under the direction of faculty members. *Prerequisite:* Permission of the faculty. Variable credits.

191, 192 ADVANCED RADIOLOGIC PROJECTS Independent projects under the direction of faculty members. *Prerequisite:* Permission of Department Chairman. Variable credits.

Religion

COLLEGE OF ARTS AND SCIENCES

Associate Professors Kahn and Paden (Chairman); Assistant Professors Andrews, Gussner, Martin, and Yarian; Instructors Brenneman, Swanson, and Sugarman.

21 INTRODUCTION TO THE STUDY OF RELIGION: ASIAN TRADITIONS Introduction to the Hindu, Buddhist, and East Asian religious traditions as expressed in

their basic symbolisms, writings, practices, and cultural forms. Three hours. Staff.

22 INTRODUCTION TO THE STUDY OF RELIGION: WESTERN TRADITIONS Study of the basic motifs, mythic patterns, and historical transformations in the religious life of man from the Ancient Near East to the modern West. Three hours. Staff.

71 THE INTERPRETATION OF RELIGION Examination of major theories and methods used in studying and interpreting religious phenomena. *Prerequisite:* religion 21 or 22. Three hours. Staff.

101 RELIGIOUS COMMUNITIES AND INSTITUTIONS A comparative study of the basic types of religious community and religious institution, within various cultural settings. *Prerequisite:* three hours in religion or sociology 22; sophomore standing. Three hours. Staff.

112 MYSTICISM, SHAMANISM, AND POSSESSION A comparative study of the ways in which the inward dimension of religious life finds expression. *Prerequisite:* three hours in religion; sophomore standing. Three hours. Staff.

122 MYTH, SYMBOL AND RITUAL Study of the meaning and varieties of myth and ritual in cross-cultural perspective, with reference to contemporary theories of symbol and language. *Prerequisite:* three hours in religion; sophomore standing. Three hours. Staff.

129 PHILOSOPHY OF RELIGION Three hours. Mr. Hall. See Philosophy 154.

141 HEBREW SCRIPTURES Study of the history and writings of the Hebraic-Judaic religion to the first century B.C. *Prerequisite:* six hours in religion; sophomore standing. Three hours. Messrs. Martin and Kahn.

142 POST-BIBLICAL JUDAISM A study of the formation of post-biblical Judaism with special attention to the Rabbinic period, 70-500 A.D. *Prerequisite:* six hours in religion; sophomore standing. Three hours. Messrs. Kahn and Sugarman.

145 PRIMITIVE CHRISTIANITY The origin and nature of early Christianity with emphasis on the New Testament writings. *Prerequisite:* six hours in religion; sophomore standing. Three hours. Mr. Martin.

148 HELLENISTIC RELIGION A study of religion in the Mediterranean area during the period from the second century B.C. through the second century A.D. *Prerequisite:* six hours in religion; sophomore standing. Three hours. Mr. Martin.

151 MODES OF CHRISTIAN EXPRESSION I A study of the teaching, rites, art and piety of Eastern Orthodox and Roman Catholic Christianity. *Prerequisite:* six hours in religion. Three hours. Mr. Yarian.

152 MODES OF CHRISTIAN EXPRESSION II A study of Protestant Christianity focusing on its orientation to the Word and its responses to developments formative of modern Western culture. *Prerequisite:* six hours in religion. Three hours. Mr. Yarian.

156 RELIGION IN AMERICA A study of the relationship between religion, the cultural ethos, and individual self-understanding in America. *Prerequisite:* six hours in religion, including Religion 22. Three hours. Mr. Martin.

161 **STUDIES IN THE HINDU TRADITION** Selected writings, rituals, and developments in the Hindu tradition with reference to cultural assumptions of India. *Prerequisite:* Religion 21; sophomore standing. Three hours. Mr. Gussner.

166 **STUDIES IN THE BUDDHIST TRADITION** Selected texts, disciplines, and doctrinal developments in Indian, Tibetan, and Chinese Buddhism. *Prerequisite:* six hours in religion, including Religion 21; sophomore standing. Three hours. Messrs. Gussner and Andrews.

171, 172 **JAPANESE RELIGION** The religion of shrine and temple, of Shinto and Buddhism, and their interaction with the rich folk traditions of Japan. *Prerequisite:* six hours in religion, including Religion 21; sophomore standing. Three hours. Mr. Andrews.

175 **CHINESE RELIGION AND THOUGHT** A survey of the religious and philosophical traditions and movements of traditional China. *Prerequisite:* six hours in religion or philosophy, including Religion 21 or Phil. 21; sophomore standing. Three hours. Mr. Andrews.

181 **'PRIMITIVE' RELIGIONS** A study of the religiousness of man in small-scale hunting and planting societies, and its external expressions, with reference to anthropological, sociological, and psychological contributions to the subject. *Prerequisite:* six hours in religion, or three hours in religion and three in anthropology; sophomore standing. Three hours. Mr. Gussner.

182 **STUDIES IN FOLK RELIGION** A study of folk tales, fairy tales, folk cults and festivals, folk deities, ogres, demons and "little people," in various cultures, and their relationship to the great traditions. *Prerequisite:* six hours in religion; sophomore standing. Three hours. Mr. Bremmnan.

187 **RELIGION AND SECULAR CULTURE** The effects of modern culture on religion, and the emergence of new forms of religious life and expression. *Prerequisite:* six hours in religion; sophomore standing. Three hours. Messrs. Brenmnan and Paden.

191 **TAO TE CHING** *Prerequisite:* six hours in religion, including Rel. 21. Three hours. Mr. Swanson. See Phil. 221.

192 **I CHING OR BOOK OF CHANGES** *Prerequisite:* six hours in religion, including Rel. 21. Three hours. Mr. Swanson. See Phil. 222.

193, 194 **COLLEGE HONORS**

195, 196 **SPECIAL TOPICS**

197, 198 **READINGS AND RESEARCH**

201 **SENIOR SEMINAR: CREATIVE HERMENEUTICS** Workshop in theory and method incorporating current developments in the field. *Prerequisites:* twelve hours in religion including Religion 71; senior standing. Three hours. Staff.

281, 282 **PROBLEMS IN THE HISTORY AND PHENOMENOLOGY OF RELIGION** Topics of current concern to historians of religions. *Prerequisite:* nine hours in religion; junior standing. Three hours. Staff.

297, 298 **INTERDISCIPLINARY SEMINAR** Student-faculty workshop on a topic of current interest, employing resources from various disciplines. *Prerequisite:* nine hours in religion; junior standing, and permission of the instructor. Three hours. Staff.

Resource Economics

COLLEGE OF AGRICULTURE

Professors Sinclair (Acting Chairman), Sargent, Tremblay, and Webster; Associate Professor Fife; Assistant Professors Gilbert, Schmidt and Smith; Adjunct Professor Houghaboom; Adjunct Associate Professor Eddy; and Adjunct Assistant Professors Bevins and Bigalow.

Program in Agricultural Economics

2 WORLD FOOD AND POPULATION Agricultural development with emphasis on natural and economic phenomena and the effect of food supplies on population trends and policies. Three hours. Mr. Tremblay.

51 AGRICULTURAL FINANCE Capital requirements of agriculture, financial problems of farmers, types and sources of credit, policies and practices of lending institutions. Alternate years, 1974-75. Three hours. Mr. Sinclair.

61 PRINCIPLES OF AGRICULTURAL AND RESOURCE ECONOMICS Introduction to principles of economics through the analysis of problems of agricultural production and resource development. Three hours. Staff.

166 SMALL BUSINESS MANAGEMENT Theoretical and practical considerations in organizing and operating small businesses. Emphasis on financing, accounting, budgeting, investment analysis, and tax management. *Prerequisite:* sophomore standing. Three hours. Mr. Fife.

197, 198 SENIOR RESEARCH Work on a research problem under the direction of a staff member. Findings submitted in written form as prescribed by the department. *Prerequisite:* senior standing. Three hours. Staff.

201 FARM BUSINESS MANAGEMENT Organization and operation of successful farm businesses with emphasis on resource allocation, production efficiency, and marginal analysis. Field trips required. *Prerequisites:* Economics 11, 12, or Resource Economics 61; junior standing. Three hours. Mr. Tremblay.

205 RURAL COMMUNITIES AND MODERN SOCIETY (See Sociology 205).

207 MARKETS, FOOD, AND CONSUMERS Market structure, prices, and economic forces involved in the movement of farm products from producers to consumers. *Prerequisite:* Economics 11, 12, or Resource Economics 61. Three hours. Mr. Webster.

208 AGRICULTURAL POLICY History and institutional development of agricultural policy. Price and income problems of American agriculture and alternative solutions. *Prerequisite:* Economics 11, 12, or Resource Economics 61. Alternate years, 1974-75. Three hours. Mr. Sinclair.

218 COMMUNITY ORGANIZATION AND DEVELOPMENT (See Sociology 207).

254 ADVANCED AGRICULTURAL ECONOMICS Theories of supply and demand analysis, price determination, market structure, and income distribution in competitive and imperfectly competitive markets. *Prerequisites:* twelve hours in resource economics and/or economics, and permission of instructor. Three hours. Mr. Sinclair.

255, 256 SPECIAL TOPICS IN RESOURCE ECONOMICS Readings and discussion of selected topics in economics at an advanced level. *Prerequisite:* departmental permission. Credit as arranged. Staff.

266 ECONOMICS OF MANAGERIAL DECISIONS Applying economic concepts to problems of capital budgeting, tax planning, pricing, demand analysis, and discounting cash flows. Cases. *Prerequisite:* Economics 11, 12, or equivalent. Three hours. Mr. Fife.

Program in Resource Economics

(For descriptions of the following courses, refer to the School of Natural Resources, pages 260-261.)

- 121 RESOURCE ECONOMICS
- 151 RECREATION BUSINESS MANAGEMENT
- 222 NATURAL RESOURCE EVALUATION
- 225 ECONOMICS OF OUTDOOR RECREATION
- 233 REGIONAL PLANNING
- 235 LEGAL ASPECTS OF PLANNING AND ZONING

Romance Languages

COLLEGE OF ARTS AND SCIENCES

Professor Weiger; Associate Professors Kohler, Julow, and Ugalde (Acting Chairman); Assistant Professors Crichfield, Geno, Wesseling, Whatley, Whitebook, Wiley and Zárate; Instructors Carrard, Murad, Núñez-de-Cela.

French and Spanish language and literature courses are listed separately below by title and number. The language sequences are designed specifically to train students in the four skills of speaking, comprehension, reading, and writing. The total sequence in each language represents a continuum into which a student with previous experience in the language will be placed according to his level of achievement, regardless of how many or how few years he may have studied it. For placement in advanced language courses (100 or above), first-year students should consult with this department. Those who have already taken courses here should simply follow the levels represented by the number sequences, 1-99, 100-199, etc. For convenience, we offer the following guidelines for placement in elementary and intermediate; in all cases of doubt students should seek the advice of this department

ELEMENTARY LANGUAGE: no previous study or less than two years of high school language.

INTERMEDIATE GRAMMAR: two to three years.

INTERMEDIATE READING AND CONVERSATION: three or more years.

Course titles and numbers:

French Language

- 1-2 ELEMENTARY Eight hours.
 19 INTERMEDIATE GRAMMAR Four hours.
 51, 52 INTERMEDIATE READING AND CONVERSATION Three hours (each course).
 121, 122 COMPOSITION AND CONVERSATION Three hours (each course).
 219 ADVANCED GRAMMAR Three hours.
 223, 224 ADVANCED COMPOSITION AND CONVERSATION Three hours (each course).
 233, 234 EXPLICATION DE TEXTES, STYLISTICS Three hours (each course).

Spanish Language

- 1-2 ELEMENTARY Eight hours.
 19 INTERMEDIATE GRAMMAR Four hours.
 51, 52 INTERMEDIATE READING AND CONVERSATION Three hours. (each course)
 121, 122 COMPOSITION AND CONVERSATION Three hours. (each course)
 219 ADVANCED GRAMMAR Three hours.
 223, 224 ADVANCED COMPOSITION AND CONVERSATION Three hours. (each course)

Literature Courses in French and Spanish

As the language courses offer a continuum for the learning of the four skills, the literature courses provide a sequential study of the development of French and Spanish literatures from the Middle Ages to the present. In addition, they offer both practice and continued training in the four language skills. While the literature courses are divided into centuries, with subcategories of genres, themes, and individual authors, it is not essential to adhere strictly to chronological order. *In general, a one-hundred level literature course or its equivalent is the prerequisite for all other literature courses; exceptions are regularly made with the approval of the department.* Questions about the precise content of any literature course should be referred to the instructor listed for the course or to the department chairman.

Course titles and numbers:

French Literature

- 151, 152 MASTERWORKS *Prerequisite:* Intermediate French or equivalent. Three hours. (each course). Mr. Crichfield.
 193, 194 COLLEGE HONORS
 195, 196 SPECIAL TOPICS
 197, 198 READINGS AND RESEARCH
 251 MEDIEVAL Three hours. Mrs. Whitebook. Alternate years, 1974-75.

- 256 16th CENTURY Three hours. Miss Wiley. Alternate years.
- 261 THE BAROQUE AGE 1600-1650. Three hours. Mrs. Whatley. Alternate years, 1974-75.
- 262 17th CENTURY 1650-1700, Three hours. Mr. Julow. Alternate years, 1974-75.
- 267, 268 18th CENTURY Three hours. (each course). Mrs. Whatley. Alternate years, 1975-76.
- 271, 272 19th CENTURY POETRY Three hours. (each course) Mr. Crichfield and Staff. Alternate years, 1975-76.
- 273, 274 19th CENTURY NOVEL Three hours. (each course). Mr. Crichfield, Mr. Julow. Alternate year, 1975-76.
- 275 19th CENTURY THEATER Three hours. Staff. Alternate years, 1975-76.
- 281 20th CENTURY POETRY Three hours. Mr. Carrard. Alternate years.
- 283, 284 20th CENTURY NOVEL Three hours. (each course). Mr. Carrard.
- 285, 286 20th CENTURY THEATER Three hours. (each course). Mr. Geno and Staff. Alternate years, 1974-75.
- 287, 288 FRENCH-CANADIAN LITERATURE Three hours. (each course). Staff.
- 291 SPECIAL TOPICS Civilization of France. Three hours. Staff.
- 293 SPECIAL TOPICS Civilization of the Francophone World. Three hours. Staff.

Spanish Literature

- 151, 152 MASTERWORKS OF SPAIN *Prerequisite:* Intermediate Spanish or equivalent. Three hours. (each course). Mr. Wesseling. Alternate years, 1974-75.
- 161 READINGS IN SPANISH-AMERICAN LITERATURE: 19th CENTURY *Prerequisite:* Intermediate Spanish or equivalent. Three hours. Mr. Zárate. Alternate years, 1975-76.
- 162 READINGS IN SPANISH AMERICAN LITERATURE: 20th CENTURY *Prerequisite:* Intermediate Spanish or equivalent. Three hours. Mr. Zárate. Alternate years, 1975-76.
- 193, 194 COLLEGE HONORS
- 195, 196 SPECIAL TOPICS
- 197, 198 READINGS AND RESEARCH
- 261, 262 GOLDEN AGE Three hours. (each course). Mr. Núñez-de-Cela. Alternate years, 1974-75.
- 263, 264 CERVANTES Three hours. (each course). Mr. Núñez-de-Cela. Alternate years, 1975-76.
- 271, 272, SPANISH-AMERICAN LITERATURE OF SOCIAL PROTEST Three hours. (each course). Mr. Zárate. Alternate years, 1974-75.
- 281 19th CENTURY Three hours. Mr. Ugalde. Alternate years, 1975-76.
- 282 20th CENTURY Three hours. Mr. Ugalde. Alternate years, 1975-76.
- 291 SPECIAL TOPICS Civilization of Spain. Three hours. Staff.

293 SPECIAL TOPICS Civilization of Latin America. Three hours. Staff.

The following extra-departmental course may be taken for credit toward a major in the Department of Romance Languages:

LINGUISTICS 101, 102 An introductory course designed to acquaint the student with the methods and theory of systematic observation and explanation of language phenomena (linguistics.) *Prerequisite:* 101 for 102. Three hours.

FOR GRADUATE COURSES (300 LEVEL), PLEASE SEE GRADUATE COLLEGE BULLETIN.

Russian and Serbo-Croatian

COLLEGE OF ARTS AND SCIENCES

Professor Paganuzzi; Assistant Professor Nalibow

1-2 ELEMENTARY RUSSIAN Four hours each course. Staff.

11, 12 INTERMEDIATE RUSSIAN *Prerequisite:* 1-2. Three hours each course. Staff.

101, 102 INTRODUCTION TO RUSSIAN LITERATURE Outstanding authors of the 19th and 20th centuries from Pushkin to Pasternak and Solzhenitsyn. Oral discussion of readings, written practice. *Prerequisite:* 11, 12. Three hours each course. Mr. Paganuzzi.

103, 104 RUSSIAN CIVILIZATION Introduction to the history of Russian culture including Russian secular and ecclesiastical painting, architecture and music from the earliest periods to the present. *Prerequisite:* 101, 102. Three hours each course. Mr. Paganuzzi.

*193, 194 COLLEGE HONORS

*195, 196 SPECIAL TOPICS

*197, 198 READINGS AND RESEARCH

203, 204 ADVANCED RUSSIAN Advanced oral and written drill, grammar review, lexical problems, roots of the Russian language. Lectures and discussions on the Russian language. Three hours each course. Mr. Paganuzzi.

271, 272 SEMINAR IN SLAVIC LINGUISTICS Course 271, the linguistic prehistory of Slavic and the study of Old Church Slavic. Course 272, history of the Russian language. Three hours each course. Mr. Nalibow.

281, 282 SENIOR SEMINAR Required of all senior concentrators. Three hours each course. Mr. Paganuzzi.

Serbo-Croatian

1-2 ELEMENTARY SERBO-CROATIAN Three hours each course. Staff.

*N.B. The series 193-198 is taught in Russian.

11, 12 INTERMEDIATE SERBO-CROATIAN *Prerequisite:* Serbo-Croatian 1-2. Three hours each course. Staff.

General Literature •

81 RUSSIAN LITERATURE IN TRANSLATION Mr. Nalibow. (See Extra-departmental Courses)

82 SOVIET LITERATURE IN TRANSLATION Mr. Nalibow. (See Extra-departmental Courses)

Sociology

COLLEGE OF ARTS AND SCIENCES

Professors Driver (Visiting fall term only), Hall (Visiting), Lewis, Mabry, Sampson (Chairman); Associate Professors Finney, Folta, Stanfield, Steffenhagen, Underhill; Assistant Professors Deming, Mccann, Nixon, Schmidt; Instructor Fishman.

Courses numbered 100 to 199 generally require either Sociology 10 or sophomore standing, but may be open to freshmen by permission of the instructor. Courses numbered 200 to 299 generally require six hours of sociology. Sociology 100 will be required as a prerequisite for many 200 level courses effective in the spring semester of 1975.

10 INTRODUCTION TO SOCIOLOGY Fundamental principles and problems in the sociological analysis of the structure and dynamics of modern society. Three hours. Mr. Finney, Ms. Fishman, and Mr. Schmidt.

100 FUNDAMENTALS OF SOCIAL RESEARCH Introduction to theory and research methods in sociology. Includes examination of basic problems in research design, measurement, data collection, data analysis and the presentation and interpretation of research findings *Prerequisite:* Three hours of sociology. Three hours. Ms. Deming, Mr. Mccann, and Mr. Underhill.

101 SOCIAL PROBLEMS Analysis of a selected number of major social problems in contemporary society. Three hours. Staff.

102 POPULATION, ENVIRONMENT AND SOCIETY Analysis of the consequences of the varying relationships among population size, social organization, technology and resource base. *Prerequisite:* three hours of sociology. Three hours. Ms. Deming, Mr. Driver, and Mr. Mccann.

105 THE COMMUNITY Analysis of the structure and dynamics of communities. Emphasis on American communities. *Prerequisite:* 10. Three hours. Mr. Lewis, Mr. Mabry and Mr. Schmidt.

109 THE SELF AND SOCIAL INTERACTION Analysis of the social nature of human personality. Special emphasis will be given to the roles of social interaction and language in the formation and structure of the self, socialization as a continuous process throughout the life-cycle, and the impact on individual attitudes and behavior of social stimulus situations. Three hours. Ms. Folta.

114 **DEVIANCE AND SOCIAL CONTROL** Analysis of social behavior that violates norms and the range of reactions to such behavior. Special attention will be given to the examination of the causes and consequences of deviance in social organization, the process of becoming a deviant, the structure of the deviant's world, and the forms of deviance control. Three hours. Ms. Fishman, Ms. Folta and Mr. Stanfield.

119 **MINORITY GROUPS** Analysis of the causes and consequences of the subordination of ethnic, racial, and religious groups in society. Special attention will be given to an examination of group prejudice and discrimination, minority group member's worlds and their relationships with dominant groups and the institutions of society. Three hours. Ms. Fishman. Alternate years, 1975-1976.

122 **WOMEN AND SOCIETY** Analysis of the changing roles of women in modern society. Special attention will be given to changes in sex role differentiation and dedifferentiation, female socialization and opportunity and their consequences for major institutions in modern society. Three hours. Ms. Deming, Ms. Folta, Ms. Fishman and Mr. Lewis.

125 **ALIENATION OF MAN IN MODERN SOCIETY** An examination of the nature and sources of social alienation of man in modern industrial society. Special attention will be given to the effects of the social organization of work, bureaucracy, urbanization and mass culture in the United States. Three hours. Mr. Steffenhagen. Alternate years, 1975-1976.

129 **THE FAMILY** Analysis of the family as a social institution. Emphasis on the forms of the American family in crosscultural perspective. *Prerequisite:* 10. Three hours. Mr. Lewis and Mr. Mabry.

132 **AFFLUENCE AND POVERTY IN MODERN SOCIETY** An examination of the structure of social inequality in contemporary America. Special attention will be given to the distribution of wealth in the United States and its association with power, prestige and opportunity. Three hours. Mr. Finney, Mr. Mabry, Mr. McCann, Mr. Nixon and Mr. Schmidt.

144 **SOCIOLOGY OF EDUCATION** Analysis of the social organization of educational roles and associations in modern society. Special attention will be given to an examination of the changing structure of the educational institution and its relationship to other institutions in society. Three hours. Mr. Lewis and Mr. Nixon.

151 **RELIGIOUS DEVIANCE, MAGIC AND THE OCCULT** Analysis of the social and cultural organization of groups professing spiritual, occult, mystical and/or magical beliefs and their relationship to the major social institutions of society. Three hours. Mr. Steffenhagen.

154 **SOCIAL ORGANIZATION OF DEATH AND DYING** Comparative examination of the nature of cultural and social adaptations to mortality in society. Special attention will be given to the ways in which family, medical, legal, religious and economic institutions respond to the fatally ill and dead in contemporary society. Three hours. Ms. Folta.

157 **DRUGS AND SOCIETY** Analysis of the nature of drug use and abuse in society. Special attention will be given to an examination of the social, cultural, psychological, legal and medical aspects of drug taking and its causes and consequences in contemporary society. Three hours. MWSJ Fishman and Mr. Steffenhagen.

161 **SOCIOLOGY OF LEISURE** Analysis of the types and social organization of non-work activity in society. Special attention will be given to the examination of the relationships of life style, social class factors, education and work to recreation and leisure use patterns in modern society. Three hours. Staff. Alternate years, 1975-76.

163 **SOCIOLOGY OF SPORT** Analysis of the types and social organization of amateur and professional athletics in society. Special attention will be given to the social origins of athletes, the structure and dynamics of athletic groups and their fans, and the relationship of sports to the major institutions of modern society. Three hours. Mr. Nixon.

165 **THE SOCIAL STRUCTURE OF THE UNITED STATES I** Examination of the major institutional structures and processes of contemporary American society. Special attention will be given to the analysis of the changing ecological and demographic bases, age and sex roles, and the kinship, stratification and economic institutions in the United States. May be taken independently of 166. Three hours. Mr. Sampson and Mr. Schmidt. Alternate years, 1975-76.

166 **THE SOCIAL STRUCTURE OF THE UNITED STATES II** Examination of the major institutional structures and processes of contemporary American society. Special attention will be given to the changing role of bureaucracy; the political, educational, scientific, religious and medical institutions; ethnic and race relations; and socio-cultural modes of integration, conflict and deviation and change in the United States. May be taken independently of 165. Three hours. Mr. Sampson and Mr. Schmidt. Alternate years, 1975-76.

193, 194 **COLLEGE HONORS**

195, 196 **SPECIAL TOPICS**

197, 198 **READINGS AND RESEARCH**

202 **POPULATION DYNAMICS** Analysis of the factors affecting human population growth and distribution, migration patterns, and the relationship between economic activity and population trends. *Prerequisite:* six hours of sociology or 10 and an introductory in biology, economics, geography or zoology. Three hours. Ms. Deming and Mr. Driver.

203 **HUMAN ECOLOGY** Analysis of the relationships between forms of social organization and their environments. Special attention will be given to the causes and consequences of the differential location of socio-economic, racial and cultural groups and the major institutional facilities of society in contemporary urban communities. Three hours. Ms. Deming and Mr. Mabry.

205 **RURAL COMMUNITIES IN MODERN SOCIETY** The changing structure and dynamics of rural social organization in the context of modernization, and urbanization. Emphasis on rural communities in America. Three hours. Mr. Finney and Mr. Schmidt.

206 **URBAN COMMUNITIES IN MODERN SOCIETY** The changing structure and dynamics of urban social organization in the context of modernization and urbanization. Emphasis upon cities and metropolitan areas in America. Three hours. Ms. Deming and Mr. Lewis.

207 **COMMUNITY ORGANIZATION AND DEVELOPMENT** Community as a changing complex of organization within modern society. Special attention will be given to problems of the formulation and implementation of alternative change strategies. Three hours. Mr. Schmidt.

209 SMALL GROUPS An examination of the structure and dynamics of interpersonal relations and informal interactions in small groups. Three hours. Mr. Nixon and Mr. Steffenhagen.

210 COLLECTIVE BEHAVIOR Analysis of the nature and types of emergent, non-institutional behavior, especially responses to shared stressful or crisis situations. Includes the examination, social origins, development and consequences of crowd, riot, disaster and craze behavior. Three hours. Mr. Finney and Mr. Stanfield.

211 SOCIAL MOVEMENTS Analysis of the nature and types of relatively organized collective action to promote social or cultural change. Special attention will be given to the genesis, structure and social consequences of political and religious movements. Three hours. Mr. Finney, Ms. Folta and Mr. Stanfield.

212 CULTURE AND PERSONALITY The cross-cultural comparison of personality development; the problem of delineating modal personality types. *Prerequisite:* 10, Anthropology 21 and one 100 level course in sociology or anthropology. Three hours. Mr. Mabry, Mr. Magnarella (Anthropology), and Mr. Steffenhagen. (Cross-listed in anthropology).

214 DELINQUENCY Analysis of the nature and types of juvenile behavior that violates law, the mechanisms for defining such behavior as delinquent, and the relationships between delinquency and the social situations of juvenile offenders. Three hours. Mr. Driver and Ms. Fishman.

215 CRIME Analysis of the nature and types of adult behavior that violates law, the mechanism for defining such behavior as criminal, and the relationships between crime and the social situation of adult offenders. Three hours. Mr. Driver, Ms. Fishman, Ms. Folta and Mr. Stanfield.

216 CRIMINAL JUSTICE Analysis of the social structures and processes involved in the specification of behavior as being legally deviant and the labeling of individuals as delinquent or criminal offenders. Criminal law, its enforcement and the courts. Three hours. Mr. Driver, Ms. Folta and Mr. Stanfield.

217 CORRECTIONS Analysis of the social structures and processes involved in dealing with individuals who have been designated as offenders of criminal law. Probation, prison, parole, programs of prevention and rehabilitation. Three hours. Mr. Driver, Ms. Fishman and Mr. Stanfield.

219 RACE RELATIONS Examination of racial subordination in social and historical context. Special attention will be given to the analysis of the forms of interracial contact, racial sub-cultures and social structures, social psychological and protest responses to racial prejudice and discrimination. Emphasis on American experience. Three hours. Ms. Fishman.

225 COMPLEX ORGANIZATIONS Analysis of the structure and dynamics of large, formal organizations. Special attention will be given to the analysis of the forms of complex organization and their external relationships, and the role of bureaucracy in contemporary society. Three hours. Mr. Finney, Mr. Hall, Mr. Nixon and Mr. Sampson.

226 SMALL GROUPS IN COMPLEX ORGANIZATION Analysis of the emergence, structure and consequences of informal interaction in large, formal organizations. Special attention will be given to the reciprocal effects of small groups and their complex organizational environments. Three hours. Mr. Nixon and Mr. Steffenhagen.

230 SOCIAL VALUE PATTERNS IN AMERICAN FAMILY LIFE A detailed examination of both the similarities and differences in social value patterns characteristic of the different segments of American family life and the relation of each to the larger American society. Attention will be given to both continuity and change in value patterns, including radical alternatives, and their significance for future developments in the family and society. Three hours. Mr. Lewis. Alternate years, 1975-76.

232 SOCIAL STRATIFICATION Comparative analysis of the social causes, structures and consequences of the differential ranking of individuals and groups in society. Special attention will be given to the criteria for social ranking, their measurement and association and intergenerational social mobility. Three hours. Mr. Finney, Mr. Lewis, Mr. McCann, Mr. Nixon, Mr. Schmidt and Mr. Underhill.

237 OCCUPATIONS AND PROFESSIONS Analysis of the social organization of economic roles and associations in industrial society. Special attention will be given to an examination of the impact of the structure of work on the individual and the relationship of occupations and professions to other institutions in society. Three hours. Mr. Hall and Mr. Mabry.

239 COOPERATIVES AND COOPERATIVE COMMUNITIES Analysis of the structure and dynamics of cooperatives as a distinctive form of complex organization in society. Special emphasis will be given to the analysis of problems associated with the development, organization and maintenance of cooperatives among the poor in developed and underdeveloped societies. Three hours. Mr. Finney. Alternate years, 1975-76.

240 POLITICAL SOCIOLOGY Analysis of the social organization of political roles and associations in modern society. Special attention will be given to an examination of the changing structure of the political institution and its relationship to other institutions in society. Three hours. Mr. Nixon. Alternate years, 1975-76.

241 PUBLIC OPINION Analysis of the factors affecting social attitude formation and change. Special attention will be given to political and social ideology. Three hours. Staff. Alternate years, 1975-76.

246 BUREAUCRACY IN EDUCATION Analysis of the formal organizational aspects of educational institutions. Special attention is given to the structure and dynamics of schools and colleges as organizations, their authority systems and relationships to other organizations and institutions of society. Three hours. Staff. Alternate years, 1975-76.

249 SOCIOLOGY OF KNOWLEDGE Reviews the development and present state of sociological theory and research on the emergence and role of belief and normative systems in society. Special attention will be given to systematic attempts to understand the causes and consequences of shared constructions of social reality. Three hours. Mr. Sampson.

251 SOCIOLOGY OF RELIGION Analysis of the social organization of religious roles and associations in modern society. Special attention will be given to the changing structure of the religious institution and its relationship to other institutions in society. Three hours. Mr. Sampson.

254 SOCIOLOGY OF HEALTH AND MEDICINE The socio-cultural environment of physical well-being and illness. Special attention will be given to the role of socio-cultural factors in the etiology, identification, definition and treatment of illness in society. Three hours. Ms. Foltz, Mr. Mabry and Mr. Steffenhagen.

255 **SOCIOLOGY OF MENTAL HEALTH** The socio-cultural environment of mental well-being and illness. Special attention will be given to the role of socio-cultural factors in the etiology, identification, definition and treatment of mental illness in society. Three hours. Ms. Folta, Mr. Mabry and Mr. Steffenhagen.

258 **SOCIOLOGY OF LAW** Analysis of the social organization of legal roles and associations in modern society. Special attention will be given to the changing structure of the legal institution and its relationship to other institutions in society. Three hours. Mr. Driver, Ms. Folta and Mr. Stanfield. Alternate years. 1975-76.

273 **METHODOLOGY OF SOCIAL RESEARCH** Basic issues in the construction and empirical testing of sociological descriptions, predictions and explanations. Consideration will be given to the philosophy and logic of social research and the socio-cultural nature of scientific inquiry; theoretical frames of reference; concept formation, measurement and validation; socio-cultural causation and measures of association; models, theories and verification; and the formalization of theories. Three hours. Mr. McCann and Mr. Sampson. Alternate years, 1975-76.

275 **METHODS OF DATA ANALYSIS IN SOCIAL RESEARCH** An examination of the methods available for studying social phenomena including laboratory and field experiments, observational techniques, social surveys, content analysis, cross-cultural comparisons and others. Basic problems in research design, sampling methods, and measurement and scaling will be investigated. Three hours. Ms. Deming, Mr. Mabry, Mr. McCann, Mr. Schmidt, and Mr. Underhill.

285 **METHODS OF DATA ANALYSIS IN SOCIAL RESEARCH** An examination of approaches to the quantitative analysis of sociological data, including table analysis, regression and path analysis, scaling and factor analysis, and the analysis of variance with emphasis on the multivariate techniques. Three hours. Ms. Deming and Mr. Underhill.

278 **THE DEVELOPMENT OF SOCIOLOGICAL THEORY** An examination of the major classical traditions in social theory and their contemporary research relevance. Detailed critical attention will be given, but not necessarily confined to, the theoretical and methodological contributions of Marx, Durkheim and Weber. Three hours. Mr. Sampson and Mr. Schmidt.

279 **CONTEMPORARY SOCIOLOGICAL THEORY** A detailed examination of selected major theoretical approaches and issues in modern sociology. Three hours. Mr. McCann, Mr. Sampson, Mr. Schmidt and Mr. Stanfield.

281, 282 **SEMINAR** Presentation and discussion of advanced problems in contemporary sociological analysis. *Prerequisite:* twelve hours in sociology and permission of the department. Three hours. Staff.

288, 289 **SEMINAR: RESEARCH AND METHODS OF TEACHING SOCIOLOGY** The development and evaluation of teaching strategies in sociology. Open only to graduate students and advanced undergraduate sociology majors who are serving concurrently as teaching assistants in the Department. *Prerequisite:* twelve hours in sociology and permission of the department. Three hours. Staff.

295, 296 **SPECIAL TOPICS**

297, 298 **READINGS AND RESEARCH**

Statistics

COLLEGE OF ENGINEERING, MATHEMATICS AND BUSINESS ADMINISTRATION

Statistics Program Steering Committee: Professors McCrorey, Sylwester (Director); Associate Professors Bee, Howell; Assistant Professors Ashikaga, Gordon, and Tashman.

✓111 ELEMENTS OF STATISTICS (3-1) Basic statistical concepts and methods: averages, correlation, regression, sampling theory, confidence intervals, and hypothesis tests. Realistic problems as laboratory projects with instruction in use of the computer for computations. *Prerequisite:* Two years of high school algebra. Three hours. Staff.

140 INTRODUCTION TO DECISION MAKING UNDER UNCERTAINTY (3) See Business Administration 140.

151 INTRODUCTION TO PROBABILITY AND DECISION MAKING Development and application of discrete and continuous probability models to real world in which outcomes are subject to random variation. Bayesian techniques used to revise prior probability distributions. *Prerequisite:* Math 26. Three hours. Staff.

211 STATISTICAL METHODS I (3-1) Fundamental ideas and techniques of statistics, with applications, used in designing, carrying out, and analyzing experiments: descriptive and inferential statistics, especially point and interval estimation and hypothesis testing. Introduction to correlation, regression, and analysis of variance. No graduate credit for statistics majors. *Prerequisites:* College algebra and junior standing or consent of instructor. Three hours. Staff.

221 STATISTICAL METHODS II (3-1) Continuation of 211 concentrating on linear and multiple regression and analysis of variance plus chi-square tests and non-parametric methods. *Prerequisite:* 211 or 241. Three hours. Staff.

227 STATISTICAL METHODS FOR THE BEHAVIORAL SCIENCES (3-1) See Psychology 341.

231 EXPERIMENTAL DESIGNS Analysis of variance including subsamples and disproportionate subclass numbers, variance components, confounding in incomplete blocks, fractional replication, multiple comparisons, split plots, and pooling of experiments. *Prerequisite:* Any one of 221, 227, 242, and 313. Three hours. Mr. Bee.

233 SAMPLE SURVEY METHODS Discussion of implementing and estimating parameters for various sampling schemes including simple random, stratified random, systematic, and cluster sampling. Discussion of relative efficiencies of designs. *Prerequisite:* 211 or 241 or 313. Concurrent enrollment in 151 or 251. Three hours. Mr. Ashikaga. Alternate years: 1975-76.

235 MULTIVARIATE METHODS Properties and statistical methods, with applications, for the multivariate normal distribution: multiple regression, non-linear regression, discriminant functions, principal components and factor analysis. Experience in data analysis using computer programs. *Prerequisites:* 241 and any one of 221, 227, and 313. Three hours. Mr. Ashikaga. Alternate years: 1975-76.

237 NONPARAMETRIC METHODS Nonparametric procedures for hypothesis testing and confidence intervals, including rank procedures and those based on

the binomial distribution. Discussion of selecting the optimum procedure for a particular problem. *Prerequisite:* 211 or 241. Three hours. Staff. Alternate years: 1974-75.

241 **MATHEMATICAL STATISTICS I** Non-measure theoretic introduction to classical statistical methods: sampling distributions, estimation procedures, tests of hypothesis, and confidence intervals. *Prerequisites:* Stat 151 or 251 and Math 124 and Math 121 or 123. Three hours. Staff.

242 **MATHEMATICAL STATISTICS II** Theory of modern statistical procedures: nonparametric methods, multivariate techniques, decision theory, sequential procedures. *Prerequisite:* 241. Three hours. Staff.

251 **PROBABILITY THEORY** Non-measure-theoretic course in probability with some applications. Axioms of probability, random variables, generating functions, laws of large numbers and central limit theorems, introduction to stochastic processes. A strong working knowledge of calculus including infinite series and multiple integration is needed. *Prerequisite:* Mathematics 33 or 102, 121, 124. Statistics 151 recommended for undergraduates. Three hours. Mr. Sylwester.

252 **STOCHASTIC PROCESSES** Discrete and continuous stochastic processes: the random walk, branching, Poisson, birth and death, Brownian and diffusion processes. Analysis of times series in both the time and frequency domain. *Prerequisite:* 251. Three hours. Mr. Sylwester. Alternate years: 1974-75.

283, 285 **SPECIAL TOPICS** For advanced students. Lectures, reports and directed readings on advanced topics. *Prerequisite:* Consent of instructor. Credit as arranged. Offered as occasion warrants. Staff.

283 **SPECIAL TOPICS IN PROBABILITY**

285 **SPECIAL TOPICS IN STATISTICS**

291, 292 **SENIOR PROBLEM** Investigation of some area or problem, under the direction of an assigned staff member, culminating in a report. Available only to undergraduate candidates specializing in statistics. *Prerequisite:* Permission of the Program Director. Three hours. Staff.

Technology

COLLEGE OF ENGINEERING, MATHEMATICS AND BUSINESS ADMINISTRATION

The College of Engineering, Mathematics and Business Administration offers the following courses on a non-departmental basis.

1 **ENGINEERING DESIGN CONCEPTS I (2-3)** See course description under Extra-Departmental Courses, page 221.

2 **ENGINEERING DESIGN CONCEPTS II (1-3)** See course description under Extra-Departmental Courses, page 221.

7 **MAN'S PLACE IN THE UNIVERSE (1-0)** Philosophy has been, over the years, mainly concerned with the problems of understanding man; his activities, his beliefs, his relationship to his fellows and his significance in the larger universe. This course endeavors to integrate and interpret existing scientific data to make comprehensible these areas of human concern. The guiding principle is that all

life must conform to the requirements of Darwin's Theory of Natural Selection and be consistent with the world's known evolutionary history. Topics include: theories of the development of the universe, nature's technique of design-by-chance, a scientific critique of religion and philosophy, the evolutionary basis of human and animal psychology and behavior, the genetic code and double-helix, the survival benefits of the religious impulse. The course will be presented in non-technical language for persons interested in practical philosophy. One hour. Mr. Rush.

51 TECHNOLOGY AND SOCIETY (3-0) An examination of the effects of modern technology on society. Non-technological views as well as those of engineers and scientists are presented. Readings from the current literature. Group study projects. *Prerequisite:* Sophomore standing. Three hours.

52 TECHNOLOGY AND THE ENVIRONMENT (3-0) Practical information on solving environmental problems with emphasis on pollution. Inter-relationships and control of land, air, and water environments. Lectures supplemented by discussion and field trips. *Prerequisite:* One semester of college chemistry or permission of the instructor. Three hours.

53 ENERGY AND THE ENVIRONMENT (3-0) Physical principles underlying various energy conversion devices for the generation of electricity. Hydroelectric, fossil fuel and atomic power plants. Direct energy conversion: photoelectric, fuel cell, and magnetohydrodynamic devices. Present and future availability of fuels, their costs, and the environmental impact of various sources of power. Three hours.

54 OUR ELECTRONIC WORLD (3-0) Fundamentals of common electronic systems including telephone, radio, television, phonograph, magnetic tape recorder, and controls. Qualitative discussion of theory and practice and live demonstrations of basic principles. *Prerequisite:* High School Algebra. Three hours. Mr. Roth.

251 TECHNOLOGY AND SOCIETY SEMINAR (3-0) Current views on the influence of technology on society through extensive study of contemporary writings and involvement in seminars, discussion and project assignments. *Prerequisite:* Either Tech 51 or permission of the instructor and Senior or Graduate standing. Three hours.

V Vocational Education and Technology

COLLEGE OF AGRICULTURE

Professors Fuller (Chairman), Schneider; Assistant Professors Bloom, Jensen, Lampe; Adjunct Faculty: Associate Professor Bornstein; Assistant Professors Halloran, Kisko, Moore.

General

5 INTRODUCTORY AGRICULTURAL ENGINEERING (2-2) Introduction to building, wiring, water supply, sewage disposal, soil and water engineering, mechanical principles, and engines for residential, recreational and farm use with environmental considerations. Three hours. Mr. Schneider.

102 **GENERAL SHOP (0-6)** Wood and metal working by hand and machine, sheet metal, welding, rope, and tool fitting. Shop layout, selection of equipment. *Prerequisite:* sophomore standing. Three hours. Mr. Schneider.

104 **LEADERSHIP PREPARATION** Group and independent study and practice of methods for teachers, officers, administrators and group members to increase their leadership ability. *Prerequisite:* Junior standing or departmental permission. Three hours. Alternate years, 1975-76.

106 **UNDERSTANDING THE MENTALLY RETARDED** Survey of nature and needs of the mentally retarded. Field trips to, and discussions with personnel from, agencies and institutions serving the handicapped. Variable credit: 1 hour for field trips, 2 hours for lectures and discussions, 3 hours for combination. Mr. Lampe.

112 **EXTENSION AND COMMUNITY EDUCATION** Introduction to community educational programs and techniques. Includes field trips and independent study. *Prerequisite:* sophomore standing. Two hours. Mr. Jensen.

152 **INTRODUCTION TO CAREER ORIENTED EDUCATION** Orientation to career education, and principles and philosophy of occupational and practical arts education. Includes field trips and independent study. *Prerequisite:* sophomore standing. Three hours. Mr. Jensen.

156 **DEVELOPING INSTRUCTIONAL MATERIALS FOR TEACHING** For students who will have educational program responsibilities in business, government, or schools. Materials will be prepared for auto-tutorial devices, audio-visual presentations, and other teaching techniques. *Prerequisite:* sophomore standing. Three hours. Mr. Jensen.

253 **TEACHING ADULTS** Problems related to organizing and planning adult education programs for schools, community organizations, government agencies or business. Techniques for teaching adults will be analyzed. *Prerequisite:* senior standing. Three hours. Mr. Jensen.

273 **TECHNICAL REPORTING** Communication of information through research and technical reports and professional articles for scientists, engineers and economists. Three hours. Mr. Spaven.

Agricultural Engineering and Technology

121 **SOIL AND WATER MANAGEMENT (2-2)** Analysis of agricultural, recreational, and other rural soil and water problems; design and application of conservation practices for environmental protection. *Prerequisite:* plant and soil science 61; civil engineering 12 desirable. Three hours. Mr. Bornstein.

131 **RESIDENTIAL, RECREATIONAL AND AGRICULTURAL BUILDINGS (2-2)** Site planning, building planning, material selection. Functional and structural considerations including heating, ventilation and insulation. Consideration of environmental relationships. *Prerequisite:* sophomore standing. Three hours. Alternate years, 1975-76. Mr. Moore.

140 **POWER AND MACHINERY FOR AGRICULTURE (2-2)** The principles of operation and maintenance of engines, tractors and agricultural field and farmstead machinery. *Prerequisite:* physics 6. Three hours. Alternate years, 1975-76. Staff.

145 **SOIL AND WATER ENGINEERING (2-2)** Hydrologic, hydraulic, and agroeconomic principles; design and installation of drainage and irrigation systems, erosion control facilities, farm and small watershed flood control reservoirs, and

other rural environmental protection practices. *Prerequisites:* plant and soil science 61, civil engineering 12. Three hours. Mr. Bornstein. Alternate years, 1975-76.

162 ELECTRICITY, WATER SYSTEMS, AND SEWAGE DISPOSAL IN RESIDENTIAL, RECREATIONAL AND AGRICULTURAL USE Wiring systems and applications of electricity, water sources and systems, sewage disposal for agriculture, residences, recreation, and rural development with environmental considerations. *Prerequisite:* sophomore standing. Three hours. Alternate years, 1974-75. Mr. Moore.

Occupational and Extension Education

150 TECHNICAL INTERNSHIP Planned, supervised, off-campus educational internship during summers and/or junior year. Technical theory plus practical application in field experiences. A student may enroll more than one time and accumulate up to 30 hours credit. *Prerequisite:* Departmental permission. Credit as arranged. Staff. I, II.

153-154 TEACHING INTERNSHIP IN OCCUPATIONAL EDUCATION Seminars for newly employed teachers of occupationally oriented subjects plus two consecutive semesters of supervised teaching. *Prerequisites:* Employment as a teacher, a teaching methods course or concurrent enrollment, and departmental permission. Four hours each. Staff.

155 TEACHING PRACTICUM IN OCCUPATIONAL EDUCATION Ten full weeks of supervised teaching in a high school or junior college; including two weeks during opening of school year. *Prerequisites:* 152, concurrent enrollment in 251; acceptance into teacher education program. Eight hours. Mr. Bloom, Mr. Fuller, Mr. Jensen, Mr. Lampe.

157 ORGANIZING AND MANAGING OCCUPATIONAL EDUCATION LABORATORIES Study of the vocational-technical laboratory as a teaching and learning environment. Includes: purchasing, inventory control, equipment placement, maintenance, and safety. Three hours. Staff.

158 EVALUATING ACHIEVEMENT IN OCCUPATIONALLY ORIENTED EDUCATION Introduction to evaluation techniques for occupational and technical subjects. Includes: test construction, teacher-made tests, and statistical analysis of scores. *Prerequisite:* A teaching methods course or concurrent enrollment, or departmental permission. Three hours. Staff.

159 DEVELOPING COURSES FOR OCCUPATIONAL EDUCATION Systematic development of course materials used in teaching occupationally oriented subjects. Includes: occupational analysis, performance objectives, course content, and supplementary instructional materials. *Prerequisite:* A teaching methods course or concurrent enrollment, or departmental permission. Three hours. Staff.

251 METHODS FOR TEACHING OCCUPATIONALLY ORIENTED SUBJECTS Advanced teaching techniques combined with micro-teaching. Emphasis placed upon teaching and program management at high school or junior college level. *Prerequisite:* Concurrent enrollment in 153 or 155, or departmental permission. Three hours. Mr. Fuller, Mr. Bloom, Mr. Kisko, Mr. Jensen.

282 SEMINAR Follow-up of teaching practicum. Required for all students completing 155. *Prerequisite:* 155. One hour. Mr. Bloom.

Independent Study and Research

197 **SPECIAL PROBLEMS** Individual investigation of a problem selected to meet special needs of students. Students may enroll more than one time and accumulate up to six hours. *Prerequisite:* Departmental permission. Credit as arranged. Staff. I, II.

295 **SPECIAL TOPICS** Lectures, laboratories and/or readings and reports to provide background and specialized knowledge relating to contemporary areas of study. Students may enroll more than one time and accumulate up to nine hours. *Prerequisites:* senior standing, departmental permission. Credit as arranged. Staff. I, II.

Zoology

COLLEGE OF ARTS AND SCIENCES

Professors Glade (Chairman), Bell, Henson, Lochhead, Potash and Rothstein; Associate Professors Davison and Stevens; Assistant Professors Brammer, Keen, Kilpatrick, Landesman, and Woods.

Biology

1, 2 **PRINCIPLES OF BIOLOGY (3-3)** Introduction to the structure, functions, and evolution of animals and plants. Emphasis on concepts important for advanced study in a Life Science and for understanding the biological world of which man is a part. *Prerequisite:* 1 for 2. Four hours. Botany and Zoology staffs.

3 **BIOLOGY AND MAN** An introduction for nonscience majors. Selected biological topics relevant to man such as cancer, human genetics, environmental toxicants; and biological principles and concepts necessary for an understanding of these problems. *No prerequisite.* Three hours. Botany and Zoology staffs.¹

7 **BIOLOGICAL ASPECTS OF ENVIRONMENTAL PROBLEMS (II)** The biological effects of environmental problems. The harmful biological impact of air and water pollutants, with major emphasis on their physiological, genetic and ecological action on plants and animals, particularly man. *Prerequisite:* Environmental Studies 1. Three hours. Mr. Potash.

101 **GENETICS** Structural basis of inheritance; gene mutations; chromosomal aberrations; genes and enzymes; gene action in differentiation; genetics of populations; nonchromosomal inheritance. *Prerequisite:* 1, 2. Three hours. Mr. Kilpatrick.

102 **ENVIRONMENTAL BIOLOGY (3-3)** An ecological approach to the structure, dynamics, energetics, behavior, and evolution of organisms, populations, communities, and ecosystems. *Prerequisite:* 1, 2. Four hours. Mr. Keen.

103 **CELL STRUCTURE AND FUNCTION (3-3)** Structure and physiology of cells, with emphasis on basic features common to all forms of life. *Prerequisite:* 1, 2. Four hours. Mr. Landesman.

¹Credit will not be given for both Biology 1, 2 and Botany 4. Credit will not be given for both Biology 1, 2 and Biology 3. Botany and Zoology majors will not receive credit for Biology 3.

105 GENETICS LABORATORY (0-3) Illustration of concepts presented in Biology 101. *Prerequisites:* 101 or concurrent enrollment and permission of the instructor. One hour. Mr. Kilpatrick.

Zoology

5-6 HUMAN ANATOMY AND PHYSIOLOGY (2-2) Dissection of the cat, plus various vertebrate organs, with direct comparisons to corresponding structure in the human body; physiological experiments; microscopic study of tissues. Three hours. Mr. Brammer.²

9 INTRODUCTORY ZOOLOGY A survey of principles of Zoology from the cellular to the organismal level, including animal diversity, elementary genetics, evolutionary biology, and emphasizing the relationship between form and function, as exemplified by the vertebrate. Four hours. Staff.³

104 COMPARATIVE STRUCTURE AND FUNCTION Anatomy and physiology of organs and organ systems in animals with emphasis on basic physiology common to all forms. *Prerequisite:* Biology 103. Four hours. Mr. Lochhead.

193, 194 COLLEGE HONORS

195, 196 SPECIAL TOPICS

197, 198 UNDERGRADUATE RESEARCH Individual laboratory research under the guidance of a faculty member. *Prerequisite:* junior or senior standing and departmental permission. Three hours or six hours.

201 CONTROL OF GROWTH AND DIFFERENTIATION Three hours. *Prerequisites:* Biology 101 and Chemistry 131, 132. Mr. Davison.

203 POPULATION ECOLOGY Analysis of growth, regulation, and interrelations of biological populations in theoretical, laboratory, and natural systems. *Prerequisite:* Biology 102. Three hours. Mr. Keen.

205 NATURAL HISTORY OF BIRDS AND MAMMALS (2-4) History, identification, evolution, ecology, behavior, zoogeography, conservation and aesthetics. *Prerequisite:* 104 or Biology 102. Four hours. Mr. Woods. Alternate years, 1974-75.

207 NATURAL HISTORY OF THE LOWER VERTEBRATES (3-3) Classification, ecology, behavior, evolution, and distribution of fish, amphibians, and reptiles. *Prerequisite:* 104. Four hours. Mr. Bell. Not offered 1974-75.

208 GENERAL ENTOMOLOGY (2-4) Morphology, physiology, and evolution of insects. *Prerequisite:* 104 or Biology 102. Four hours. Mr. Bell. Alternate years, 1975-76.

209 FIELD ZOOLOGY (2-4) Collection and identification; study of local habitats, their nature, and adaptations to them; factors governing distribution methods of preparing study specimens. *Prerequisite:* 104 or Biology 102. Four hours. Mr. Bell.

²May be taken for credit in the College of Arts and Sciences but does not satisfy the requirement of a course in biology for premedical and pre dental students. Students will not receive credit for both this course and zoology 104.

³This course is not intended for students who plan to become Biology or Zoology majors but may be taken by transfer students who have already taken a semester of botany. Credit will not be allowed for both Zoology 9 and Biology 1, 2 or Zoology 5-6.

211 EMBRYOLOGY (2-4) Principles exemplified by typical invertebrate and vertebrate embryos. *Prerequisite:* 104. Four hours. Mr. Glade.

212 COMPARATIVE HISTOLOGY (2-4) Anatomy of tissues, chiefly vertebrate. Tissue similarities and specializations of organs among the various groups of animals in relation to function. *Prerequisite:* 104. Four hours. Mr. Glade.

216 HUMAN GENETICS Inheritance; population genetics; interaction of heredity and environment; application to human problems. *Prerequisite:* Biology 101. Three hours. Mr. Kilpatrick.

219 COMPARATIVE VERTEBRATE ANATOMY (2-4) Structure, function, and phylogeny; survey of evolutionary and functional trends; investigation of the structure of all chordate groups. *Prerequisite:* 104. Four hours. Mr. Woods.

220 MECHANISMS OF CELL DIVISION Fine structure and physiology of normal and abnormal cell division; emphasis on mechanisms. *Prerequisite:* Biology 103, a course in biochemistry, and the consent of the instructor. Three hours. Mr. Stevens. Alternate years, 1974-75.

222 EXPERIMENTAL EMBRYOLOGY (2-6) Theoretical approach based on research in embryology, genetics, physiology, bacteriology, and related fields. *Prerequisite:* 211 and departmental permission. Four hours. Mr. Glade. Alternate years, 1974-75.

223 BIOCHEMICAL EMBRYOLOGY Biochemical and structural differentiation of cells and tissues during oogenesis and embryogenesis. *Prerequisite:* 101, 211. A course in biochemistry is recommended. Three hours. Mr. Landesman. Alternate years, 1975-76.

225 ENVIRONMENTAL PHYSIOLOGY (2-4) Processes by which animals cope with moderate, changing, and extreme environments. *Prerequisite:* Biology 102 and 104. Four hours. Mr. Woods. Alternate years, 1975-76.

231 CELL PHYSIOLOGY (2-4) Experimental techniques used to elucidate chemical and physical mechanisms within living cells. *Prerequisite:* Biology 103, chemistry 131, 132, and departmental permission. Four hours. Mr. Rothstein.

236 LIMNOLOGY (2-4) The ecology of standing waters: the biota of lakes as related to the geological, physical, and chemical conditions of lakes. *Prerequisite:* Biology 102, Inorganic Chemistry, and junior standing. Four hours. Mr. Henson.

237 ECOLOGY OF RUNNING WATERS (2-4) Stream and river environments, adaptations of organisms to varying physical, chemical, and biotic conditions. *Prerequisite:* Biology 102, Inorganic Chemistry, and junior standing. Four hours. Mr. Potash.

240 INVERTEBRATE ECOLOGY OF THE MOUNTAINS An intensive study of the invertebrate fauna of Camel's Hump and vicinity. *Prerequisite:* Biology 102 or a course in invertebrate or insect taxonomy. Four hours. Mr. Bell.

250 INVERTEBRATE ZOOLOGY (2-4) Anatomy, physiology, and life histories of representatives of the more important phyla. *Prerequisite:* 104. Four hours. Mr. Lochhead.

251 INSECT STRUCTURE AND FUNCTION (3-3) Anatomy and physiology with emphasis upon growth, reproduction, and sensory physiology. *Prerequisite:* 104 or consent of instructor. Four hours. Mr. Brammer. Alternate years, 1974-75.

255 COMPARATIVE ANIMAL PHYSIOLOGY (2-6) General principles of function in invertebrates and vertebrates. *Prerequisite:* 104, departmental permission and Chemistry 131, 132. Four hours. II. Mr. Rothstein.

270 MODERN EVOLUTIONARY THEORY Contributions of modern research in genetics, systematics, distribution, experimental embryology, serology, and related fields to problems of evolutionary change. *Prerequisite:* Biology 101 (Biology 102 recommended). Three hours. Staff. Alternate years, 1975-76.

271 ADVANCED LIMNOLOGY Analyses of current concepts and problems. *Prerequisite:* 236. Four hours. Mr. Henson.

281 through 283 SEMINAR Review and discussion of current zoological research. Graduate students and seniors in zoological research programs may enroll. Without credit. Staff.

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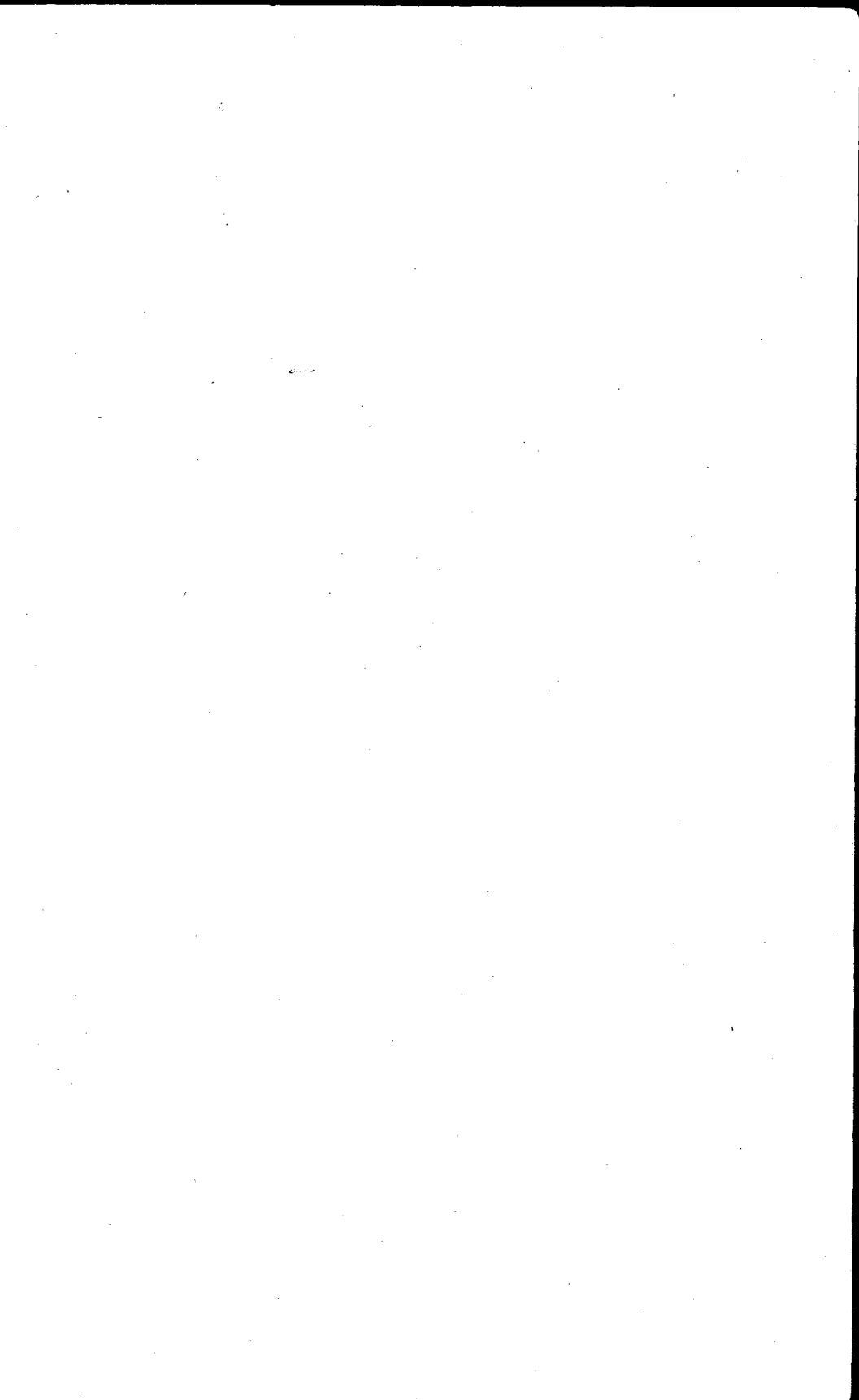
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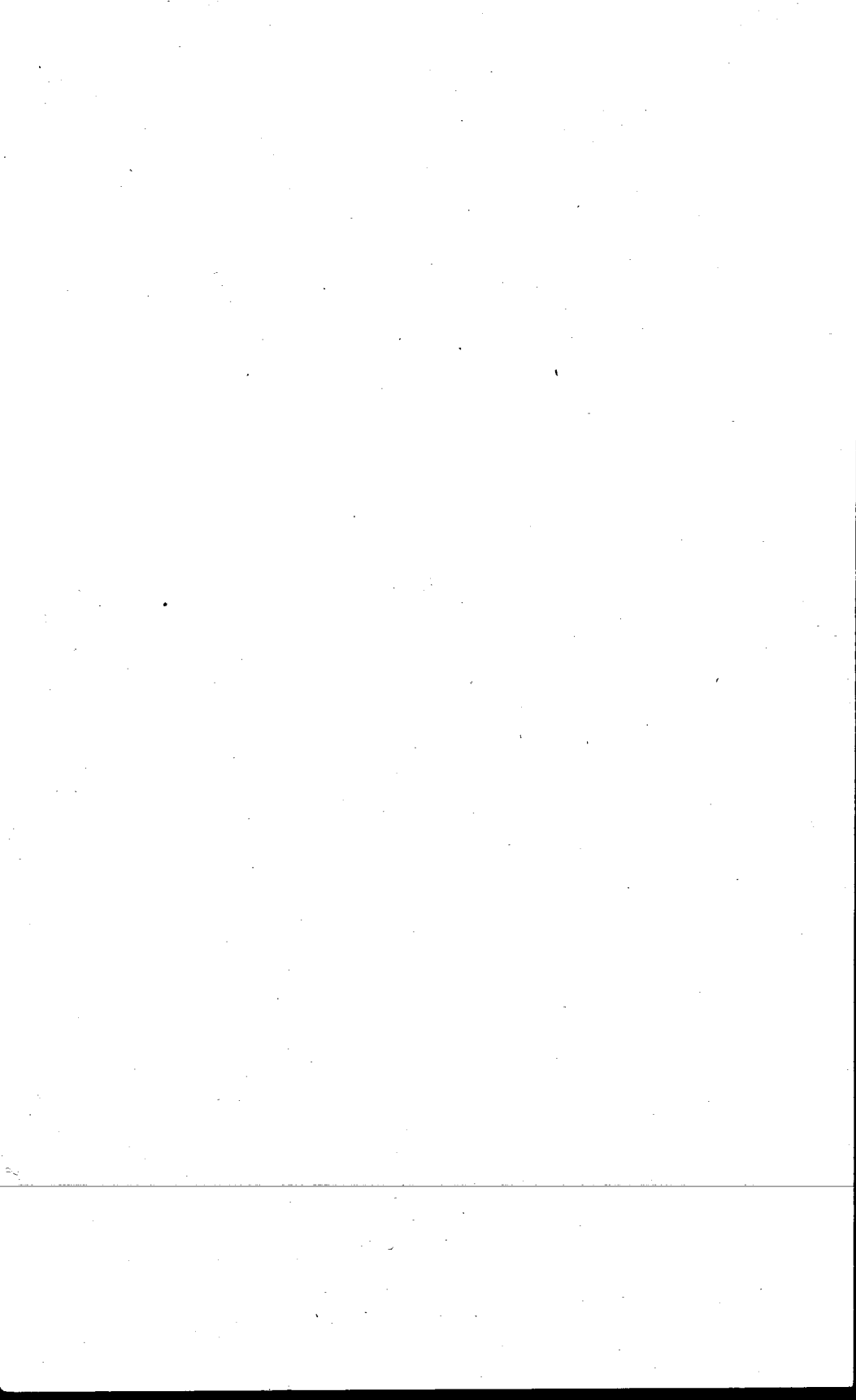
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versial matter which has no relation to his subject. Limitations of academic freedom because of religious or other aims of the institution should be clearly stated in writing at the time of the appointment.

"The teacher is a citizen, a member of a learned profession and an officer of this institution. When he speaks or writes as a citizen he should be free from institutional censorship or discipline, but his special position in the community imposes special obligations. As a man of learning and an educational officer he should remember that the public may judge his profession and his institution by his utterances. Hence he should at all times be accurate, should exercise appropriate restraint, should show respect for the opinions of others, and should make every effort to indicate that he is not an institutional spokesman."

In addition there are recognized qualifications which must be attained and maintained before the privilege of being a member of the academic profession can be considered a permanent one: satisfactory performance as a teacher, scholarship, and high moral standards.

Responsibility of the Institution to the Faculty. The University must defend tenaciously the right of its members to think and express their thoughts freely and to make those choices within the law guaranteed to every citizen. This includes the right of dissent since any democratic institution ceases to merit the name democratic when this fundamen-

tal right is denied. Never is this duty more imperative than in those unhappy times when the public opinion of the community would restrain or curtail the free play of ideas. The universities, whose roots extend back into the centuries, have a tradition and a duty to maintain an independence of judgment in the face of public emotion.

While the universities must be sensitive to the needs of the community and nation, they need not and should not abrogate their position of leadership. This duty of the institution has never been so well stated as by Thomas Jefferson in his letter to prospective faculty members at the University of Virginia: "For here we are not afraid to follow truth wherever it may lead, nor tolerate error so long as reason is free to combat it."

Academic Freedom and Tenure. Tenure is an indispensable precondition for academic freedom. It is, in fact, a guarantee that the institution subscribes to the principle of academic freedom, and that its members may not be dismissed without adequate cause. Termination of tenure should occur only in cases of bona fide financial exigency in the University or when it has been demonstrated that the teacher lacks professional or moral fitness or competence as a teacher.

In the interpretation and the application of these principles we shall expect the University authorities to be quick to protect its heritage of academic freedom, in doubtful cases remembering that an excess of freedom is always less dangerous than an excess of constraint.

The statement on academic freedom reprinted on our covers was adopted by the University of Vermont Faculty Senate September 23, 195